Industrial Development Subsidiary Agreement

SOLID FUEL BURNING APPLIANCES

A Study of Supply, Demand and Manufacturing Prospects in British Columbia

NOVEMBER 1981

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NOVEMBER 1981

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The Federal Department of Regional
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The preparation of this study was carried out by Woodbridge, Reed and Associates Ltd. in association with Kent Engineering Ltd. Both companies are located in Vancouver, B.C.

The responsibility for the content of this report is the Consultants' alone, and the conclusions reached herein do not necessarily reflect the opinions of those who assisted during the course of this investigation or the Federal and Provincial governments which funded the study.

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EXECUTIVE SUMMARY

Production capacity in the SFBA industry in B. C. grew rapidly during the mid to late 1970's in response to a sharp resurgence in demand. Rapid growth in the industry took place also in many other parts of North America.

There was a marked increase in the number of manufacturers, many of whom produced comparatively few SFBA'S in relatively small scale plants. New entrants into the industry were encouraged by a number of factors including a) the fairly low level of capital investment needed b) the fragmented and diverse geographical nature of SFBA markets in the province and c) the attractiveness of the industry to small business enterpreneurs.

Growth in demand for SFBA's was stimulated by a number of factors. The main reason was the relatively sharp increases in prices of conventional fuels. Other factors were the growing awareness of the inefficiency of standard masonry fireplaces, the availability of efficient airtight SFBA's, increased household formation rates and changing lifestyles, which promoted growing acceptance of wood fueled appliances for heating.

Other stimulative factors to sales in B. C. were the removal of the sales tax on SFBA's and the federal COSP program which promotes conversions to other fuels from oil by direct financial incentives to the purchaser.

It is estimated that approximately 39,000 SFBA's were sold in B.C. in 1979 and about 31,900 units in 1980. While the B.C. market remained comparatively buoyant up to 1980, SFBA demand in many other parts of North America experienced a sharp decline, which has continued up to the time of this study. A further drop in SFBA demand was experienced in B.C. during 1981 and consumption is estimated to have declined to 25,100 units.

The combination of a rapid build-up of manufacturing capacity and the subsequent market decline, has led to a situation of severe production over-capacity in SFBA's in many parts of North America. Much of the downturn in SFBA demand has been attributed to lower levels of economic growth and sharply lower levels of new housing starts, particularly in the U.S.

A survey of manufacturing capacity shows that potential production capacity in B.C. exceeds prospective demand by a substantial margin.

Of the various types of SFBA's manufactured in B.C., it is estimated that stoves account for about half of the total produced. Fireplace inserts also account for a fairly large proportion of output (about 40 per cent of the total). The balance includes free standing fireplaces, heat forms, hot water boilers, pool heaters and wood furnaces.

Zero-clearance fireplaces are not manufactured in the province and are imported from other areas. In addition, cast iron units, which are not produced in B.C., are imported from Europe, and a variety of mild steel models are brought in, from time to time, from other areas in North America.

Between 20 and 25 per cent of the B.C. industry's production was exported in 1979/80, primarily to markets in Alaska, Alberta, Washington, the mountain states and to the U.S. South. The trade in SFBA's is a reflection of the wide range of models involved. In the case of exports, Canadian producers have had a fairly substantial competitive edge over their counterparts in the U.S. by virtue of the Canadian dollar exchange rate advantage in U.S. funds and a more favourable tariff situation.

Successful export trade has been achieved by some manufacturers, partly as a result of their developing strong distribution links through to the retail level. The growth of specialty SFBA stove dealerships has helped. In addition, the number of retail dealers of all types is large and their geographical penetration has been extensive.

The major market segments in B.C. are a) the existing housing market b) the new housing market and c) the commercial/small industrial market. The existing housing market comprises the demand for SFBA's from households converting an existing masonry fireplace, upgrading an existing SFBA and "first-time" buyers of an SFBA for primary or secondary space heating.

The existing housing sector is considered to be the largest future market for SFBA's in B.C. Demand will depend on a number of factors, such as availability of solid fuels, fire insurance rates for buildings with SFBA's, safety and air pollution considerations and the price of conventional heating fuels. It is projected that a total of 87,500 SFBA's will be sold in this market over the period 1982 to 1986.

Demand for SFBA's in new housing is the second largest market in B.C. Recently, reduced levels of single family housing starts have led to a decline in SFBA sales to this market. However, a gradual upturn in building activity is anticipated in 1983 through 1986 and SFBA sales are expected to improve significantly. It is projected that a total of 60,000 SFBA's will be sold to this market over the period 1982 to 1986.

Although the commercial/small industrial market for SFBA's is comparatively small, it could become significant in the future, particularly in dollar terms. Multi-fuel units are expected to grow in significance. Over the period 1982 to 1986, it is projected that 1,000 SFBA's will be sold in this market.

The table below summarises the projections by major market segment (in thousands of units).

Projection of Demand for SFBA's in B.C.

	1982	1983	1984	1985	1986	5 Year Total
In Existing Houses	15.0	17.0	20.5	17.5	17.5	87.5
In New Houses	10.0	12.0	14.0	13.0	11.0	60.0
In Commercial/ Light Industrial Uses	0.1	0.1	0.2	0.3	0.3	1.0
Total	25.1	29.1	34.7	30.8	28.8	148.5

Source: Table 6

It is difficult to estimate future export demand for SFBA's because overall production capacity in North America appears to exceed probable demand. Nevertheless, Canadian producers presently have a reasonably strong competitive edge in U.S. markets.

Favourable export opportunities may exist, as overall demand recovers, in Alaska, Alberta, Washington and the mountain states. However, strong distribution links through to the dealership level or, alternatively, unique product design, etc., and continuation of existing foreign exchange advantages, will be required for any long term penetration of export markets.

From the point of view of existing manufacturers, a number of business development strategies appear possible. These include:

1) Market Identification, in order to improve the producer's knowlege of existing market requirements.

2) Forward Integration, involving the development of appropriate distribution links through to the retail level.

3) Market Expansion, through intensified sales efforts in the major market segments.

4) Product Review and Development, in order to determine what can be done to improve existing product lines, or to develop new ones, to better meet the needs of the market.

Finally, safety problems have occured in the use of SFBA's. In some cases, this has been due to improper design and manufacture. More frequently, improper installation and use have been the cause. Progress has been made in overcoming such problems through certification of SFBA's and supplier and consumer education.

GLOSSARY OF TERMS AND ABBREVIATIONS

Airtight or Airtight Design	Refers to SFBA's which are built with close fitting doors and tightly sealed combustion chamber for close control of combustion rate by varying the rate at which combustion air is admitted.
CMHC	Canada Mortgage and Housing Corporation
COSP	Canadian Oil Substitution Program
CSA	Canadian Standards Association
EMR	Government of Canada, Department of Energy, Mines and Resources.
FUP	Free Use Permit
SFBA	Solid Fuel Burning Appliance(excludes masonry fireplaces)
ULC	Underwriters' Laboratories of Canada
WH	Warnock Hersey Professional Services Ltd.

Note:: For consistency throughout this study, use is made of the term 'solid fuel burning appliance' (SFBA) although, in most instances, the B.C. market involves primarily woodfuel burning appliances. It excludes masonry fireplaces. A description of the types of appliances generally used in North America, and those most frequently sold in British Columbia, is provided in Section 4.0 and illustrations of typical SFBA's are shown in Appendix C.

DEFINITION OF GEOGRAPHICAL AREAS IN B.C., REFERRED TO IN THE TEXT

Lower Mainland

Greater Vancouver Regional District, the Central Fraser Valley Regional District and the Sunshine Coast Regional District.

Vancouver Island - Coast

All regional districts on Vancouver Island plus the mainland coastal areas of Comox-Strathcona Regional District and Mount Waddington Regional District.

Southern Interior, Central and Northern B.C.

All other areas.

1.0 INTRODUCTION

During the mid to late 1970's, the solid fuel burning appliance (SFBA) industry in B.C. experienced a major increase in the demand for its products. Initially, the demand could not be met by the manufacturing capacity available in B.C. Consequently, there was an upsurge in the number of SFBA's imported from other parts of Canada, the U.S., Taiwan and from Europe.

The few then existing B.C. manufacturers, and a large number of entrepreneurs, recognised the opportunity to invest in new production facilities, and franchising operations, in B.C. The outcome of this was that the number of manufacturers increased substantially. So too did B.C.'s capacity to produce SFBA's. Although imports were not completely replaced, the type of appliance imported subsequently was confined to types not made in B.C. At the same time, a few B.C. manufacturers developed export markets for their products. The growth of the SFBA manufacturing industry in B.C. also had a positive impact on the demand for products made by its support industries, such as metal chimney manufacturers, steel plate suppliers and steel fabricators.

A number of influences stimulated the growth in demand for SFBA's during this period. The relatively sharp increases in the prices of conventional fuels, which occurred following the so-called "OPEC energy crises", were certainly a major factor. But there were other influences as well, notably changing lifestyles and consumer readiness to accept wood-fueled heating appliances as an alternative to conventional fuel appliances and fireplaces.

In the early stages of this period of rapid demand growth, there were fewer constraints than there are today on establishing an SFBA manufacturing business. Capital investment requirements were low. There was a rapidly growing market and government financial incentives were available. Even now, it is not a difficult business to enter. While there are a small number of larger producers, there are a large number of small scale plants producing locally designed, or modified designs based on better known makes.

By 1980, however, demand for SFBA's in the U.S. and eastern Canada had started to decline sharply. This was mainly attibuted to lower levels of overall economic activity and a sharp decline in new house construction. Although the market for SFBA's in Western Canada remained buoyant longer than in other areas, apparent consumption declined noticeably in 1980 and has continued to the present time. The situation today is one of relatively low demand accompanied by severe overcapacity in production facilities.

Other parts of the industry also have been adversely affected by the decline in demand for SFBA's, particularly in the distribution sector. The number of manufacturers, distributors and dealers who sell to the public grew very rapidly in the late 1970's. By 1981, most were experiencing a sharply decreased share of the market.

It became evident that, with the outlook for a further decline in SFBA demand, the industry in B.C. and North America as a whole was approaching a period of shaking-out and subsequent rationalization. Already, in 1980-81, several companies were facing the prospect of, or already had gone into, bankruptcy.

Consequently, since governments have provided financial incentives to the growth of the SFBA manufacturing industry in B.C., the Ministry of Industry and Small Business Development and the Department of Regional Economic Expansion (DREE) decided that there was a need for an independent and objective study of the B.C. industry's manufacturing capacity and market potential, and commissioned this study.

2.0 OBJECTIVES

The objective of the study is to provide a profile of the B.C. solid fuel burning appliance manufacturing industry and to determine the market prospects for B.C. appliance manufacturers over the period to 1986.

An attendant aim of this study is to provide existing and potential manufacturers, support industries, various levels of government, and other interested parties, with an assessment of the existing situation and outlook from a B.C. viewpoint. Also, it is to provide evaluations of product supply, market prospects and related factors to assist manufacturers in planning their future business strategy in the SFBA industry in B.C.

In addition, the study is intended to provide an evaluation of market growth expectations in B.C., as well as possible export demand in the Pacific Northwest, other parts of North American and overseas.

3.0 STUDY METHOD

The first phase of the study involved generating the necessary data relating to the solid fuel burning appliance industry in British Columbia and in selected other areas of Canada and the U.S. In addition, support industries in B.C. were identified. Trade representatives were contacted, trade journals were consulted, and a literature search of related material was conducted.

In the second phase, field interviews were carried out, throughout B.C., with manufacturers, distributors and dealers to develop additional industry and market information. This was subsequently analyzed, leading to the demand projections presented in later sections.

4.0 CLASSIFICATION OF SOLID FUEL BURNING APPLIANCES

4.1 Types Available in North America

Solid fuel burning appliances generally available in North America fall into five basic categories. These are: fireplaces, space heaters, furnaces, boilers and accessories. Each of these categories is described below, generally in line with a classification used by the Canadian Wood Energy Institute.(1) In addition, the main types of SFBA's are illustrated in Appendix C.

Fireplaces and Fireplace Retrofits

Masonry Fireplaces - are built on site with masonry material such as bricks and refractory liners.

Factory-Built Zero-Clearance Fireplaces - are fireplaces designed to be installed safely against combustible materials. Most include a heat circulating chamber similar to that in heat forms.

Free-Standing Fireplaces - these are primarily of steel or cast iron construction and feature flexibility in location. Some offer double wall construction for more efficient air circulation. Most are of airtight design.

Fireplace Inserts - these are designed to be retrofitted to an existing masonry fireplace and are, in essence, a self-contained space heater. Some have glass doors. A baffle plate installed above the insert just below the damper prevents heat loss up the chimney. Most are of airtight construction.

Heat Forms - are double walled fire chambers of metal construction, designed to be incorporated in masonry fireplaces, and function like warm air furnaces to improve the efficiency of masonry fireplaces.

Space Heaters

Space heaters are divided into two main groups - radiant and circulating. Most are of airtight design. Some of the airtight designs have bi-metallic coil thermostats which, through rod or chain linkage, operate a draft damper to control the rate of combustion.

Radiant Space Heaters (Stoves) - supply most of their heat in the form of radiant heat. Usually, the outside walls of the firechamber are the same as the outside walls of the heater (stove). High efficiency units are of airtight design.

Circulating Space Heaters - these comprise a firechamber surrounded by a cabinet which allows for ample air movement from, and to, the room through louvered openings. High efficiency units are of airtight design.

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(1) Canadian Wood Energy Institute. Installation, Operation and Maintenance of Wood Burning Appliances Course Manual (1979)

Stove-Fireplace Combination - these units are generally front loading stoves with two swing type doors which, when open, allow for placement of a fire screen over the opening.

Furnaces

Wood Furnaces - most wood-only furnaces are essentially a large size circulating heater with a fan. Most are airtight and thermostatically controlled.

Combination Wood/Oil Furnaces - are a comparatively new addition to the field of home heating appliances. They are largely wood and oil fired forced air units. Those certified for use in Canada have separate combustion chambers for wood and oil. The heat exchangers are joined in such a way that flue gases enter a common flue pipe. One common pipe carries the gases to the chimney. The furnace is equipped with two room thermostats - one connected to the damper motor of the woodburning combustion chamber and the other to the oil burner. The oil burner thermostat is usually set a few degrees below the setting of the wood burner thermostat.

Solid Fuel and Oil Fired Combination Boilers

Much of what has been said about the combustion aspects of furnaces is true of boilers or combination boilers. The essential differences lie in the heating medium which, with a boiler, is water rather than air.

Fireplace Accessories

A variety of fireplace heat extractors and heat savers are available, designed to extract and use some heat which would otherwise rise up the chimney. These include:

Tube Grates - which replace regular grates and extract additional heat. The most common type involves U-shaped pipes where room air enters at lower ends and leaves at upper ends under natural convection or forced by blowers.

Glass Fireplace Doors - are designed with the intention of preventing excess heated room air from escaping up the chimney when the fireplace is in operation or when it is not being used.

Chimney Top Sealing Dampers - these devices are available to prevent heat loss due to a poor fitting fireplace damper during times the fireplace is not in operation. Operation is usually by a cable running along the inside of the flue.

4.2 Certification of Solid Fuel Burning Appliances

There are two certification agencies in Canada which set standards and which have gained countrywide recognition. These are the Canadian Standards Association (CSA) and the Underwriters' Laboratories of Canada (ULC). To be certified, a product must be tested to the CSA or ULC standards by either CSA or ULC themselves or by other recognised testing organisations, such as Warnock Hersey Professional Services Ltd.

Whenever one of these organizations certifies a product, it permits its identifying label to be applied to that product stating the standards to which the product has been tested. A solid fuel burning appliance that is certified is considered to have been tested in accordance with, and to have met, the Standard for Solid Fuel Fired Appliances for Residential Use, CSA B366-M1981. The corresponding ULC standard is ULC-F627-1981.

"Certified" should be distinguished from "Approved". Approved refers to acceptance by an enforcing authority such as a municipal building department or a fuel or fire safety inspector. A certified product usually gains approval more readily than a product that is not certified because it has met a recognised set of requirements or standards.

5.0 INDUSTRY PROFILE

5.1 Background

Wood burning appliances used before the advent of gas and oil fired heaters and furnaces were comparatively simple in construction. Their equivalents today are considerably different. In contrast to the earlier models, many of the modern appliances are considerably more fuel-efficient and, through air tight construction, control of combustion rate is possible.

Some are controlled with electric or non-electric thermostats and some may have electric damper controls, fan controls and safety limit controls. A number of manufacturers are considering the installation of catalytic burners to decrease creosote formations and air pollution. Combination wood and oil burning furnaces are also available. Wood-fueled "add-ons" to gas, oil, and electrical furnaces and boilers are being further developed.

The majority of today's purchasers have little or no previous experience with wood burning equipment. It is now being recognized by governments, the industry, and wood energy use organizations that high safety standards are essential in such a situation. Conventional building and mechanical codes are found to be inadequate in some cases, and building inspectors enforcing the codes are sometimes unfamiliar with the product. The lack of consumer familiarity, and sometimes that of code enforcement officials, often stems from a lack of knowledge of the airtight design element of modern SFBA's.

As a result, a large measure of professional responsibility for adequate installation and advice on use is placed upon suppliers of SFBA's. Many manufacturers work closely with building code and fire safety officials to assure that human safety considerations are met. In many instances, the trade liaises with researchers and environmental regulators to achieve product designs which are efficient and have lower detrimental effects on the environment.

There are also air pollution concerns. The use of wood as a residential fuel results in increased particulate, carbon monoxide and polycyclic organic materials emissions, in comparison with other residential fuel types. The new air-tight stoves, when operating at an air-starved condition, may give rise to extremely high emissions of organic pollutants which, in turn, can have potential adverse health effects. Coal is prone to lead to high sulphur dioxide and particulate emissions. Indoor air pollution by combustion gases, and by a fungus that grows in wood chip piles, has also raised concern.

Concerns also have been expressed that the independent harvesting of wood for residential use will be costly in terms of injuries and deaths, and some groups are arguing that such harvesting is properly part of primary wood harvesting operations and should be carried out by commercial concerns or forest industry companies. Ways of doing this are being studied. The Wood Utilization Act of 1980 (PL96-554) was enacted in the U.S. in December 1980 to collect better information and to demonstrate ways to increase use of wood residue for residential, commercial, industrial and power plant applications.

Historically, the order of development of SFBA's in North America can be listed as follows:

- Fireplace
- Franklin Stove
- Wood and coal, and combination wood and coal, burning stoves of various designs intended to heat an individual room or two rooms
- Wood and coal, and combination wood and coal-burning furnaces and boilers intended to heat all rooms in a home
- Free-standing fireplaces
- Airtight wood and coal stoves, and combination wood and coal stoves, and fireplace inserts of various designs intended to heat a room or two rooms
- Combination wood/oil and wood/electric furnaces and boilers
- "Add-on" wood and coal fired, and combination wood/coal fired, furnaces and boilers designed to supplement existing oil or gas fired and electric furnaces and boilers.

In the early 1970's, the appliances used in North America typically were not of an airtight design. The airtight design feature was adopted from imported European cast iron stoves during the late 1970's. This feature has been added to the welded, mild steel constructed SFBA's traditionally made in North America in which the only cast iron component is sometimes the door. Components or features presently under development or trial to increase efficiency and safety are catalytic combustors and room and flue-gas temperature controls.

At the same time, aesthetic features of the mild steel airtight SFBA's are being elaborated. Appearance always was important to the consumer, even before the advent of airtights. However, initially, in the absence of attractive airtights being available, the typical North American consumer was prepared to accept a stove which, even if not attractive, was at least efficient.

5.2 Types of Solid Fuel Burning Appliances Manufactured

Many of the types of appliances described in the previous section are available in B.C. Only SFBA's of welded mild steel construction listed in Table 1, are manufactured in B.C. and most are designed primarily for burning wood. SFBA's of cast iron construction and other types of SFBA's are imported.

The majority of B.C. produced SFBA's are radiant space heaters or stoves, and fireplace inserts of airtight design. It is estimated that of the 28,400 units (1) produced in B.C. for sale to residential markets in the province, or for export, in 1980, between 85 and 90 per cent were either stoves or inserts. Stoves were the largest single item, accounting for about half the units produced. Approximately 40 per cent were inserts. The balance included free standing fireplaces, heat forms, hot water boilers, pool heaters and wood furnaces.

On a regional basis, it is estimated that about half the SFBA's sold in the Lower Mainland area(2) in 1980 were inserts. In the Vancouver Island-Coast region, on the other hand, only about 30 per cent of units sold were inserts. In the southern Interior and central Interior/northern B.C. areas, about 40 and 10 per cent respectively of the units sold were inserts.

It should be noted that there is considerable design and manufacturing similarity between free standing circulating space heaters and inserts. Consequently, manufacturers are usually able to switch from the production of one to the other through minor modifications. A fireplace insert assembly comprises essentially a stove set into an enclosure with inlet and outlet air openings at the front. The back of the stove is modified to the contours of the back wall of a masonry fireplace, and the flue is located and shaped to connect with the masonry fireplace chimney through a steel plate which closes off the larger fireplace chimney opening on installation.

Although appliances manufactured in B.C. are of welded mild steel construction, some have cast iron or cast aluminum doors. Recently, there has been a trend towards installing glass panels in the doors, although there is considerable debate as to the merits of this aesthetic feature in terms of visibility of the fire, glass durability, safety, and cost.

Free standing fireplaces of the "Acorn" type are not manufactured extensively in the province. There is one major producer who reports that most of the company's production is exported to the southern U.S. Fireplace accessories such as tube grates and glass doors are, as a rule, not made by stove and fireplace insert manufacturers but by manufacturers of fireplace screens and fireplace decorative items.

Generally, the types of SFBA's produced by the various manufacturers in B.C. have many similarities. They are also similar to SFBA's from other provinces and the U.S. Any market advantage gained through unique design features or innovation in technology is likely to be short-lived, as they tend to be copied fairly quickly by others.

The majority of products produced in B.C. are certified by the Canadian Standards Association (CSA), Underwriters' Laboratories of Canada (ULC), or Warnock Hersey Professional Services Ltd. (WH). Wood-burning appliances must be tested to CSA Standard CSA B366-M1981 or ULC Standard ULC-F627-1981 in order to be eligible for the Canadian Oil Substitution Program (COSP) grants and, in some cases, to be approved by municipal building departments for installation. Of the 29 manufacturers identified, 23 have certification on all or some of their products.

(1) see section 5.0 for a discussion of B.C.'s production
(2) see Glossary for definition of geographical areas

Table 1

Types of Solid Fuel Burning Appliances and Accessories Manufactured in British Columbia

Fireplaces and Fireplace Retrofits

- Masonry fireplaces (Not included in the designation of SFBA used in this study)
- Free standing fireplaces
- Heat forms
- Fireplace inserts

Space Heaters

- Radiant space heaters or stoves
- Circulating space heaters
- Stove-fireplace combinations

Furnaces

- Wood furnaces
- Combination wood/electric furnaces

Boilers

- Wood-fired hot water boilers
- Combination wood/coal/refuse/oil/gas/hot water boilers
- Pool heaters

Accessories

- Tube grates for fireplaces
- Glass doors for fireplaces
- Wall and floor guards
- Chimney brushes
- Stove pipe

Sources: Industry contacts and trade journals.

None of the products, however, is rated for efficiency. Efficiencies of stoves and fireplace inserts generally are in the range of 40 to 60 per cent. Nor are the products rated for heat output; some manufacturers give only floor area as a guide for selecting unit size, without specifying conditions such as building construction and outdoor design temperatures.

While SFBA's manufactured in B.C. are not in any significant way different from their counterparts manufactured in other parts of Canada or the U.S., the differences between them and their European cast iron counterparts are quite marked. Most SFBA's of mild steel construction attempt to emulate the appearance of cast iron units through styling or the use of cast iron or cast aluminum doors. Some mild steel SFBA's tend to have a modernistic electric or gas appliance-like appearance with enamelled panels and plain legs or a single pedestal. Cast iron SFBA's have a more definite traditional stove-like appearance, often with all kinds of artistic embellishments to which cast iron lends itself.

Cast iron SFBA's which are imported primarily from Europe, are airtight and well designed and have a proven record of durability and service. They have the advantage of being lighter by about 45 kg (100 pounds) than comparable ones of mild steel. This is particularly true of cast iron stoves of double-wall construction which have no refractory on the walls. Cast iron also lends itself to the construction of aesthetically pleasing small stoves, such as the "Ulefos" model 868 which is 58 cm high x 28 cm wide x 48 cm long (23 inches x 11 inches x 19 inches) and weighs 52 kg (115 lbs.). In comparison, small mild steel stoves tend to look like small strongboxes or safes. Cast iron stoves can be knocked-down for shipment or replacement of components, such as a wall or top, without having to discard the whole stove. This is not possible with mild steel stoves. Advantages and disadvantages claimed for cast iron and mild steel stoves are listed in Table 2 for comparison.

Strictly from a manufacturing viewpoint, the relative advantages of mild steel stoves clearly outweigh those of cast iron. Not surprisingly, steel stove manufacturing has gained wide acceptance and this situation seems likely to continue since steel stoves can be made at least to appear like their cast iron cousins. Market acceptance has been very high and the shortage of cast iron SFBA manufacturing capacity is, in any case, a restriction on the demands of the market. The manufacture of cast iron stoves, such as those imported from Europe, requires sophisticated and specialized foundry facilities, as well as a skilled labour force and market opportunities similar to those available to the European manufacturers, to justify the considerable investment in plant. Although the job-foundries in B.C. are capable of producing stove components such as doors, the production of cast iron stoves is another matter.

5.3 SFBA Designs

It is estimated that more than half of the SFBA's produced in B.C. are manufactured under some form of franchise arrangement. Vancouver Island and the central and northern portions of B.C. are typified by independent manufacturers, while franchised licensees are more prominent in the Lower Mainland and southern Interior where manufacturers generally serve a more widely dispersed market.

TABLE 2

Comparison of Relative Advantages and Disadvantages of Cast Iron Stoves and Mild Steel Stoves

Cast Iron

Advantages

- has higher strength and durability than mild steel under heat stresses induced by repeated firing and cooling.
- heats up evenly, holds heat longer and radiates heat more evenly than mild steel
- can be cast into intricately designed patterns
- stove is usually lighter and can be disassembled for transport for less bulk
- component parts can be replaced

Disadvantages

- more readily broken or fractured than mild steel
- are much more difficult to manufacture because of the specialized foundry facilities and close material quality control that are required
- manufacture on a small scale is not economically feasible
- a skilled labour force is required
- manufacturing costs are higher

Mild Steel

Advantages

- mild steel plate and sheet is readily available at reasonable cost and thus the stove maker is not responsible for material quality control
- services of shearing and forming mild steel plate stove components are readily available from the steel suppliers or steel fabricators, thus capital investment may be decreased
- once preformed mild steel plate components are purchased, only a minimal capital investment is necessary, essentially for welding and finishing equipment
- only welding skills are required for mild steel stove assembly
- the product is not easily damaged physically
- manufacture of a wide range of models and sizes can be readily undertaken as no expensive molds are required
- small-scale production can be economically feasible because of the low capital investment required and availability of construction materials as well as labour
- mild steel lends itself to "one-of-a-kind" or custom construction

Disdavantages

- lacks, or has fewer of, the advantages claimed for cast iron

Under an SFBA manufacturing license or franchise agreement, the local manufacturer agrees to produce units according to the design specifications of the parent company or licensor, using the licensor's brand name and logo. National advertising is coordinated by the licensor, and regional advertising is frequently subsidized. Other benefits to the franchised manufacturer include: the avoidance of design costs; the probability of obtaining certification from testing authorities more readily because of prior certification in the U.S.; and benefits of the parent company's research and development programme. In return for the franchise privileges, the licensee typically pays a set royalty per unit sold, in addition to the initial cash purchase of the license.

American manufacturers benefit through franchise arrangements in B.C., as selling prices of the licensee's units are typically lower than selling prices of the same imported SFBA units. A substantial 18.1 per cent tariff barrier is encountered (Canada Customs Tariff Item #44300-3) by U.S. producers exporting to Canada. Units imported into Canada are not assessed federal sales tax, but a further 5 per cent levy is applied against replacement parts. Import duties and the exchange rate differential between the Canadian and U.S. dollar are sufficient to make manufacture under franchise more desirable than importing SFBA's from the U.S.

The franchise arrangement appears to have been a significant factor behind the relatively rapid rate of growth of some SFBA manufacturing firms in B.C. Examples are large manufacturers, such as Ebco Industries Ltd. and E.S.C. Manufacturing Corporation. An exception to this is RSF Energy Limited which, although sizeable, has developed its own designs.

While some of the smaller manufacturers produce under franchise, others have successfully designed their own units. The latter include E.P. Industries Ltd. (Pacific Energy Division), Wilk Stove Ltd., Osburn Industries Ltd. and Rosedale Machine Shop Ltd. One manufactuer, HGD Canada Inc., manufactures, under license from a firm in Austria, a multi-fuel (oil, gas, coal, wood, refuse) fired hot water boiler with heat output capacities in the range of 68,000 to 659,000 Btu/hr.

5.4 Plant Size

One principal characteristic of the SFBA industry in 1981 was the large number of manufacturers with under-utilized productive capacity. The large number of producers is the result of rapid growth in demand in the late 1970's, the relative ease of entry into the industry, the low initial capital investment required and the dispersed geographic nature of the market for SFBA's.

It is estimated that, at the end of 1980, there were approximately 200 manufacturers of wood burning appliances in Canada, of which 60 were in Ontario (30 per cent of the total) and 29 were in B.C. (15 per cent of the total). These figures are estimates and it should be noted that there is no published comprehensive list of manufacturers available.

Some stoves were made by individuals in the past. These individuals have since developed their businesses and are now small manufacturers, or no longer make stoves at all.(1)

The total number of SFBA manufacturing plants identified in B.C., as of September 1981, was 29. Of these, 11 were located in the Lower Mainland, 7 were in the Vancouver Island-Coast area, 10 were in the southern Interior and one was in the central and northern B.C. area.

The regional dispersion of manufacturing capacity within B.C. is fairly closely associated with population distribution in the province and, with the exception of the Lower Mainland, illustrates the local nature of much of the woodstoves market in B.C. Vancouver Island manufacturers tend to serve the Island-Coast market almost exclusively. The northern region is supplied by regional production, and units from southern Interior and Lower Mainland areas. Lower Mainland and southern Interior producers distribute product to most areas in B.C. and to the U.S. Pacific Northwest.

Table 3 summarizes the size distribution of B.C. manufacturers according to reported capacity. Of the 29 firms identified, 15, or about half, reported capacity to produce up to 500 units. The average production in this category was 285 units, with 300 to 400 units per year being fairly typical. However, in total, these 15 manufacturers accounted for only approximately 16 per cent of B.C.'s total production capacity.

Most of the 15 manufacturers in this category produced both stoves and inserts, but four produced only stoves and one produced only inserts. One produced only a multi-fueled hot water boiler, and another produced pool heaters in addition to stoves and inserts. A number of manufacturers in this category also produced items such as stovepipes and ironwork components. Some of them are not primarily involved in SFBA production and regard it only as a sideline business. A few are large, fairly diversified firms whose major business lies in steel fabrication, sheet metal work or machinery production.

It is estimated that there were five manufacturers with capacity of between 501 and 1,500 units in the 1980/81 season. They accounted for probably 15 per cent of B.C.'s production in 1980.

In the next largest capacity category (1,501-3,000 units), six manufacturers were identified. One of these is a relatively sizeable producer of free standing fireplaces and another produces mainly fireplace heatforms. The remaining four

(1) Individuals who make a stove once, or occasionally, are not regarded as being part of the industry, or classed as a manufacturer, for the purposes of this report.

Table 3

British Columbia: Size Distribution of SFBA Producers and Per Cent Output (1980)

Plant Size (reported production capacity)	No. of Firms	Per cent of B.C. Reported Production[1]
up to 500 units	15	16
501-1500 units	5	15
1501-3000 units	6	41
over 3000 units	3	28
	29	100

[1] based on estimated 1979/80 production levels

Source: Consultants' survey of manufacturers (September 1981). See Appendix A for additional details.

manufacturers in this category reported that they concentrate on stoves and inserts. This category accounted for about 41 per cent of B.C.'s total production in 1980.

A total of three producers were identified with SFBA capacity, mostly in stoves and inserts, of over 3,000 units in the 1980/81 season. Overall, this category accounted for about 28 per cent of B.C.'s total production in 1980.

Of the 29 manufacturers in B.C., four have an in-plant shear and brake facility, enabling them to cut and preform SFBA components. Other producers purchase their requirements of preformed mild steel plate SFBA components.

While there were wide variations in manufacturing floor space area, most medium sized manufacturing operations (excluding preformed component production) utilized an area of approximately 3,000-5,000 square feet, exclusive of storage and office areas.

There is considerable difference between the various firms in the number of people involved in SFBA manufacturing. In most instances, production is seasonal and manpower requirements are highest in the period from September to February of the following year. Manufacturers who produce free standing fireplaces and fireplace heat forms operate throughout the year because production goes to the construction trade or is exported.

Employment data was not divulged in each case, but for nine larger manufacturers who reported the size of their labour force, average employment was 18 persons in September, 1981. The corresponding average for the smaller plants was five persons.

Discussions with stove and fireplace insert manufacturers disclosed that a typical rate of output per operator is around one unit per day. This correlates fairly well with employment and output data obtained during the field visits. At the lower end of the range, other factors, such as working hours, have to be taken into account. As a rule of thumb, an average output per operator of one unit per day appears to be generally valid and is used in the financial analysis presented in Section 5.9.

Most SFBA manufacturers in B.C. appear to have been in business for at least two years, and only two plants were identified which have been operating for less than a year. There were a small number who had been in the business over five years, and a fairly large number between two and five years.

5.5 Method of Production

The production steps for a welded mild steel SFBA are typically as follows:

1) Shear mild steel plate for stove body (e.g. sides, top and bottom) to size (if done in-plant)

2) Form or bend sheared mild steel plate (if done in-plant)

3) Cut legs and miscellaneous components from standard steel sections (e.g. angles) or fabricate

4) Assemble stove body by welding and attach legs, flue connection, etc.

5) Mount cast iron or steel door

6) Grind all welds and edges smooth

7) Line firebox with firebrick

8) Paint exterior with stove paint in paint spray booth

9) Attach trim hardware, such as door handle knobs and labels

10) Inspect and package.

There appear to be relatively few examples where significant economies of scale in SFBA production are achievable, or have been achieved, in the B.C. industry. Typically, the assembly process is labour, rather than capital, intensive. This appears to be the major constraint, at present, to increasing productivity not only in the B.C. industry, but elsewhere.

The greatest scope for economies of scale appears to be in the shearing and forming steps and possibly in the grinding stage where sand blasting equipment, such as a "Wheelabrator", can be justified or is available from other plant operations. In most cases, however, the majority of plants do not have equipment for shearing and forming mild steel plate (required for steps 1) and 2) above) but contract out this work to their steel plate suppliers or steel fabricators.

5.6 Raw Materials and Components

Raw materials and components for SFBA manufacture include mild steel plate (purchased as already sheared and formed, if the manufacturer does not have equipment for these operations), steel sections for fabricating legs and miscellaneous items, such as cast iron doors, trim hardware, welding rod, firebrick, and stove paint.

The largest suppliers of steel plate and sheared and formed steel plate to the industry are located in the Lower Mainland, but have distribution centres in most regions of B.C. Some castings, such as doors, are made by foundries in Vancouver and Victoria; others originate in other provinces and the U.S. As a rule, licensors of SFBA's provide cast iron doors to their licensees imprinted with the brand name and logo or other distinguishing features. Since the large manufacturers who use cast iron doors obtain them from U.S. sources, and other large and many small manufacturers use steel doors, the demand for foundry products generated by SFBA manufacturers is not large.

5.7 Plant Equipment

Since the majority of plants receive their cast iron doors, trim hardware, and sheared and preformed mild steel plate components from outside sources, only basic assembly and finishing equipment is required, usually comprising the following:

- Welding machine(s)
- Ironworker or punch and press
- Bandsaw
- Acetylene gas cutting torch
- Hand tools, such as grinding wheels, sanders, drills, etc.
- Forklift
- Spray paint booth
- Air compressor

The ironworker, which performs a number of operations such as punching and bending, and a bandsaw are not essential in a small operation and can be replaced by a number of hand-held, electrically operated tools. Spray painting can be carried out in the open or in well-ventilated areas without a spray paint booth. Therefore, for a small operation, the only equipment of consequence is a welding machine and some hand tools usually possessed by a mechanic.

5.8 Potential Production Capacity in B.C.

It was mentioned earlier that the SFBA industry has a considerable amount of under-utilized productive capacity. In B.C., production of SFBA's in 1980 is estimated to have totalled around 28,400 units, a decline of about 19 per cent from the 35,200 estimated for 1979. Potential production capacity(1) for the industry is estimated to have been close to 39,000 in 1980, suggesting a 73 per cent overall rate of capacity utilization for 1980. In individual cases, the rate of capacity utilization was difficult to determine.

It is important to note the limitations of the definition of the term "potential production capacity". Generally speaking, the capacity of existing physical plant is not the major factor which limits a firm's output of SFBA's. As noted earlier, the process is labour intensive. Consequently, output is tied closely to the number of operators involved in the process and the number of working hours. Firms normally can extend their physical plant fairly easily, with only minimal additional equipment (eg the addition of any extra welding station).

As a result, the typical firm theoretically could extend its capacity substantially. Most of the producers interviewed were fully aware of this and indicated that they might be willing to do so under very good market conditions. In practice, however, most smaller manufacturers would have to be willing to sacrifice time spent on other business activities and/or leisure activities. Also, the larger manufacturers would encounter additional constraints such as the need for additional space, managerial input, training of more operators and increased working capital.

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(1) based on an average of a 7.5 hour single shift use of existing equipment, a seasonal production pattern of four to five months, and estimates of previous maximum output achieved.

While a sizeable number of manufacturers stated that they could increase their annual output by at least two or three times, it seems unlikely that this would happen in reality for the reasons stated above. Consequently, the estimates of possible output shown in the table below are based on the Consultants' assessment of realistic expectations given these factors. The estimates are not a projection of future supply and indicate only the magnitude of possible increases in output based on existing capacity.

Estimates of Possible Output
from Existing SFBA Capacity in B.C.
(thousands of units)

	Survey Estimates			Forecast	
	1979	1980	1981	1982	1983
Potential Production Capacity	36.0	39.0	43.0	45 to 55	45 to 55+
SFBA Production	35.2	28.4	20.0*		

Source: Survey Estimates and Consultants' Forecasts
* Preliminary estimate.

Future demand for SFBA's is examined in Section 6.0, which also provides further discussion of future supply/demand balances relating to the table above.

5.9 Financial Aspects of SFBA Manufacture

Reference has already been made to the comparatively low level of initial capital investment required to enter the SFBA manufacturing industry. Many existing small to medium size manufacturers who entered the industry in the 1978/79 period did so with a surprisingly low level of capital commitment.

Recently, the trend towards product certification, for example, has raised product standards and increased initial capital requirements. In addition, at the currently fairly high rates of interest on borrowed capital, carrying charges have increased operating costs significantly. Competition in the industry for market share is also very strong.

As a reflection of the wide range of sizes of SFBA manufacturing plants in B.C., their diverse locations and the ways in which they were established, it may be misleading to quote "average" capital costs and "average" operating costs. Manufacturing plants in B.C. vary in capacity from 50 units per year in some of the smaller shops, to 4,000-6,000 units per year in a few of the larger, functionally integrated factories, as noted earlier.

Instead, reference is made to a typical small manufacturer (i.e. one producing up to 1,000 units per year) and to a typical large manufacturer (i.e., one producing over 1,000 units per year).

Capital Costs

During the field surveys, manufacturers were requested to supply information regarding their capital and operating costs. Cooperation was received in about three out of every four cases, and the data supplied were later correlated with apparent or reported production capacities. The detailed survey results are tabulated in Appendix A.

In general, a reasonably good correlation was attained for capital costs, the major variations being attributable to (a) differences in the age of the machinery (and therefore the depreciable value), (b) differences in definition/understanding of capital costs (manufacturers were requested to supply building, equipment and land costs separately), (c) unwillingness on the part of some manufacturers to be too specific, for competitive reasons, and (d) variations between those manufacturers investing in completely new machinery and those purchasing used equipment.

At the low end of the range, a small number of low volume producers reported that their initial capital equipment costs, some years ago, amounted to less than $10,000. In some cases, they reported that used machinery had been purchased. At the other end of the scale, investments of up to $250,000 were reported by some of the producers in the 2,000-4,000 unit range. Generally, the typical small producer reported costs in the range of $30-60,000 (adjusted to 1981 prices) for capital equipment to set up a plant capable of producing around 750 stoves and inserts per season. Obviously, there would be variations outside this range according to the product being made, equipment selected, and so on.

For a typical large producer, equipment capital costs could vary from $65-100,000 for a 1,500 unit per season production level. In most instances, manufacturers reported that premises were leased rather than owned. Some of those reporting relatively high capital equipment costs had purchased some preforming machines.

Operating Costs

Operating costs here are taken to include production costs, factory overhead, administration and advertising costs, and depreciation charges. In some cases, product research and development costs are included. As these vary widely between the various types and sizes of SFBA's, between different operations, and according to the proportion of productive capacity used, adjustments have been made in the example provided.

The various cost elements in the example in Table 4 are expressed as a percentage of the average factory selling price, and therefore do not include dealers' margins. Comments are provided below.

Table 4

Typical Operating Costs -SFBA Manufacturing in B.C.

Based on: Factory Selling Price[1] = 100% of which:

		Per Cent
	Purchased Materials	40.0
	Direct Labour	17.5
= A.	Direct Operating Costs	57.5
	Factory Overhead[2]	17.5
	Administration[3]	10.0
= B.	Overhead Costs	27.5
	Total Production Costs (A & B)	85.0
	Average Profit Margin [4]	15.0
	Factory Selling Price	100.0

Source: Consultants' survey of manufacturers (1981)

Notes:

[1] net of dealers' margins and commissions

[2] includes depreciation (wide variation) and some direct labour (i.e. supervisory costs)

[3] includes advertising and promotional costs and assumes a moderate level of interest paid on borrowed capital

[4] excludes income from "soft" or forgiveable loans and excludes companies which made losses (e.g., in some first year operations)

- Purchased Materials and Utilities

Steel is usually the largest single cost item. Other items are power, castings, firebricks, and, for certain types of units, glass. Other items purchased include welding supplies, decorative items, and so on. Discussions with manufacturers indicated that cost sensitivities were greatest with respect to steel and glass. In a number of instances, high quality glass imported from Japan was reported to have increased sharply in price in recent years. Items of fairly low cost sensitivity include fire-bricks and welding supplies.

- Direct Labour

Direct labour includes labour for welding, assembly, painting and packaging, and accounts for about 18 per cent of the factory selling price. Average output per operative typically is one unit per day.

- Factory Overhead

This is taken here to include depreciation charges on capital equipment, utilities, rental of buildings and equipment, repairs and maintenance, as well as supervisory and salary costs, and typically accounts for about 18 per cent of factory selling price.

- Administration

The cost items included in this category include office supplies and related costs, telephone, employee benefits, interest and bank charges, and administrators' salaries. Largely because of variations in where they should be classified, these costs vary quite widely as a proportion of the total, but typical unit costs are about 10 per cent of factory selling price.

- Average Profit Margin

Manufacturers' profits per unit varied, but generally were reported to be about 15 per cent of factory selling price.

5.10 Product Pricing Structure

Profit margin data generally were not available to the Consultants, or were not known, but a number of producers indicated that distributors' and retailers' profits on sales are 15 per cent and 30 per cent respectively. The following formulae were indicated:

Factory Price x 1.4 = Distributor's price
Distributor's price x 1.42 = Retail price
Factory Price x 2.0 = Retail price

However, where the manufacturer sells directly to the retailer, there is usually enough margin to use a factor, say, in the range of 1.4 to 2.0, in arriving at the retail price based on the manufacturer's price. As has already been mentioned, most SFBA manufacturers in B.C. sell directly to retailers and thus avoid the distributor's mark-up.

To gain some concept of comparative manufacturers', distributors' and retailers' selling prices, the prices for one product line of stoves and fireplace inserts are listed below:

	Model Identification					
	No. 1	No. 2	No. 3	No. 4	No. 5	No.6
Dealer's selling price	$440	$500	$570	$700	$750	$900
Distributor's selling price	308	350	399	490	524	629
Manufacturer's selling price	220	250	285	350	375	450

Source: Manufacturer's price list

Model No. 3 is a medium-sized stove and the price structure for it is considered to be representative of most of the stoves sold in B.C. Model No. 5 is a fireplace insert similar in heat output capacity to the Model No. 3 stove.

5.11 Sales and Distribution Structure

The SFBA marketing structure in B.C. may be broken down to three levels as follows:

Manufacturers who produce SFBA's, whether independently or under a franchise agreement with a larger organization. Manufacturers may have their product wholesaled by distributors, or retailed directly by dealers. Many manufacturers also retail directly from in-plant showrooms or production areas.

Distributors who are sometimes employed as intermediaries between manufacturers and retailers. Their primary function is to warehouse inventory and to move stock between manufacturers and dealers. Distributors may select dealers on the manufacturer's behalf, and some may act as a manufacturer's representative where servicing of units is required. Some distributors may also be involved in direct retail sales to consumers or sales to contractors and industrial and commercial end users.

Most of the larger SFBA manufacturing companies use the distributor link in their marketing operations. Where a distributor is employed by a manufacturer, the system operates, in many respects, similarly to manufacturers' franchise agreements. Distributors are given sole rights or franchises to distribute a manufacturer's product to dealers within specified market areas. Territories are significant in size, ranging from a region of B.C. to all of Canada. It is estimated that, in 1980, there were perhaps 12 active distributors of SFBA's in B.C.

Dealers who retail SFBA's to the public. Some dealers act as distributors for a particular SFBA line in addition to their retail trade. SFBA units are marketed in a wide variety of specialty stores and in the hardware sections of lumber yards. There are in excess of 100 dealers in the province who sell SFBA's solely. The number of sales outlets of all kinds approaches 200.

The SFBA market is currently characterized by an imbalance between the growing number of producers and dealers, and the considerably more limited growth in consumer demand. A decline in each manufacturer's market share, and those of distributors and dealers, has developed as a direct result of this imbalance.

In order to encourage sales through lower prices to the end user, and yet maintain or improve their past profit margins, some large manufacturers who previously sold through distributors have begun selling directly to dealers at large. Some members of the trade see this as a "distress action" on the part of those manufacturers involved, in reaction to the currently acutely over-supplied market.

Given the large number of retail outlets, with generally low sales per outlet, some SFBA dealers are reported to be investigating other product lines to carry in the summer months. Barbecues and accessories have been considered as the most likely items, as the sales seasons for these items complement SFBA sales. However, the additional expense and physical warehouse space required to carry the larger range of items in inventory might be a constraint for some retailers.

6.0 THE DEMAND FOR SFBA'S IN B.C.

6.1 Estimated Annual Sales of SFBA's in B.C.

Many of the factors which led to the growth in consumption for SFBA's in other parts of Canada and the U.S. since the mid 1970's, have also had a corresponding impact on sales in B.C. These include the relatively rapid increases which have taken place in conventional heating fuel prices, particularly oil, and the growing perception, among many people, of the attractiveness of wood fuels for either primary or secondary heating purposes.

Other factors include the growing availability of favourably priced, and attractively constructed, SFBA's which can be fitted easily into new and existing houses. The increased number of retail distribution outlets, particularly the specialty stores, now selling SFBA's has certainly had an important impact on sales through displays of the various types of units available, the provision of promotional literature, price lists, hints on product selection, and guidance regarding safe installation by the "home handyman".

In recent years, per capita sales of SFBA's in B.C. have been higher than in other parts of Canada. In October 1980, the Canadian Renewable Energy News magazine (1) reported that "British Columbia is the most active wood heating province in Canada". Part of the reason for this was attributed to the relative strength of the B.C. economy during this period and to the increased number of new single family housing units being built in the province, compared with earlier years. (2)

The trade press in 1980 and 1981 included various references to the apparent size of the B.C. market. In March 1981, B.C. Business magazine (3) quoted one industry source as indicating that up to 40,000 wood burners would be sold in 1981 for a value of around $20 million (an average price of $500 per unit). The 40,000 unit sales figure predicted for 1981 appeared in a number of press articles on the woodstove business in B.C., and it appears to be generally accepted by many in the industry in B.C.

For the purposes of this study, it was felt that these estimates needed to be checked. Consequently, a survey of distributors and dealers was undertaken at the same time that the survey of manufacturers was being carried out (see Section 5.0). In total, 17 distributorships and dealerships on Vancouver Island and in the Lower Mainland region were interviewed in person (see Appendix B).

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(1) Canadian Renewable Energy News (October 1980) "Wood Heat Boom in B.C. Not Found Elsewhere"
(2) see Section 6.6 for discussion of building activity in B.C.
(3) B.C. Business (March 1981) "Stove Market Heating Up"

Supplementary data were collected by telephone interviews with others in the province, and the data obtained was tabulated with information collected from the survey of manufacturers.

The distributors and dealers contacted were cooperative and confirmed the general feeling that sales of SFBA's in B.C. had increased rapidly until 1979. In some cases, they indicated a further improvement in sales during 1980, particularly on Vancouver Island and in the B.C. Interior. A significant number in the Lower Mainland and Capital regions, however, reported that they had experienced either a levelling off or a decline in sales volume during 1980. Most blamed the apparent decrease in their sales on what they perceived to be a major increase in the number of sales outlets in the province.

As a rule, most distributors and dealers were understandably reluctant to divulge confidential sales data. Many of those contacted simply did not keep records of their sales of SFBA's or, in the case of some of the larger dealers, aggregated their SFBA sales data with other categories of merchandise. While useful market data and viewpoints on the industry were obtained, the results of the survey were subsequently considered too imprecise to arrive at a statistically reliable figure of sales of SFBA's in the province as a whole.

In order to calculate total sales of SFBA's in B.C., therefore, the Consultants based their estimate on the production data derived from the survey of manufacturers, adjusted for estimated imports and exports, and supplemented by data obtained from the trade regarding sales volumes of the principal types of units sold by them.

Section 5.0 indicated that a total of 35,200 SFBA's were produced in 1979 by the B.C. manufacturing industry. Production is estimated to have declined by about 19 per cent, to 28,400 units in 1980.

B.C.'s trade statistics (1) do not differentiate sufficiently between the various types of heating appliances to arrive at an accurate figure of SFBA imports and exports. The same is true also of the overall trade statistics for Canada(2). Nevertheless, dealers in B.C. reported that a total of 12,400 SFBA units were imported in 1979, and around 10,000 units in 1980. The major manufacturers involved in SFBA exports from B.C. indicated a total export volume of 8,700 units in 1979 and approximately 6,500 in 1980.

On the basis of these data, Table 5 summarizes the Consultants' estimates of SFBA sales in B.C. for 1979 and 1980. It is estimated that total sales of

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(1) External Trade Reports - Province of British Columbia. Commodity Class Reference No. 65-329.

(2) see Statistics Canada Catalogue #65-004 Exports by Commodities and #65-007 Imports by Commodities

Table 5

Estimate of SFBA Consumption/Sales in B.C.

	1979	1980
	(No. of units)	
B.C. Produced Units		
Lower Mainland	35,200	13,600
Vancouver Island-Coast		2,500
S. Interior, Central and Northern B.C.		12,300
Total B.C. Production	35,200	28,400
Imports[1]	12,400	10,000
(Exports)[2]	(8,700)	(6,500)
Apparent B.C. Consumption/Sales	39,000	31,900

[1] units from areas other than B.C.

[2] units to areas other than B.C.

Source: Consultants' estimates based on industry survey, import and export data and unpublished company data.

Note: data are calendar years

SFBA's in 1979, were around 39,000 units. Further, it is estimated that sales in 1980 fell to a level of approximately 31,900 units, a decline of over 18 per cent from the previous year.

6.2 Consumer Purchasing Considerations

Consumers appear to be influenced by any of a number of factors when choosing an SFBA. The major ones include:

- product efficiency and aesthetics
- price of the unit
- unit size.

SFBA Efficiency and Aesthetics

Efficiency and visual appeal are becoming increasingly influential in the consumer's purchasing decision. SFBA's, however, have no standard efficiency ratings and the consumer is left to depend on any manufacturer's specified ratings, advice of the supplier or what he 'feels' is efficient. Furthermore, many consumers are not aware that the efficiency of wood burning stoves depends on its design, the condition and design of the chimney, correct installation, the type of wood fuel and the operator's skill in starting the stove.

Fortunately, the increased number of specialist retailers selling SFBA's has resulted in a great improvement in this respect. Public education appears to have increased significantly, assisted by sales literature, hints on the purchasing of an SFBA and correct operation.

A 1979 Gallup Survey (1) indicated that, up until the mid 1970's, the visual appearance of an SFBA unit was the primary motivation for purchase. This correlates well with the gradual evolution of the SFBA industry outlined earlier. There were no efficient SFBA units on the North American market at that time, and efficiency was not a major consideration in stove design or purchase. However, with the appearance in 1978 of efficient airtight models on the North American market, comparative efficiency became an important consideration in the purchase of SFBA's.

A 1980 study (2) prepared by the Puget Sound Power and Light Company indicates that, for 60 per cent of those people surveyed, "wood burning efficiency was the major factor influencing their decision to obtain a wood heating unit".

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(1) quoted in Alternative Energy Today (May 1981)

(2) Residential Wood Heating Survey. Puget Sound Power and Light Company, Market Research (1980)

Some types of SFBA manufactured in B.C. combine efficiency and aesthetic functions in one unit. Most notable on today's market are SFBA's with the facility to be used as closed airtights, or opened up and used as fireplaces. Glass doors on airtight units permit the fire to be viewed at all times. Even though this trend is important, it should also be recognized that there are consumers who are only interested in the efficiency of the unit and prefer furnaces or stoves with no fire-viewing facility, of which a large variety is available.

Price

The degree of price-sensitivity is variable factor in relation to sales of SFBA's. The 1980 Puget Sound study (1) indicated that, among the people interviewed, the cost of the unit was one of the least important factors behind purchase of an SFBA. Some in the SFBA industry indicate, however, that in their opinion, price can be the determining factor, depending on the attitude of the consumer and the purpose for which the unit is destined.

Some retailers felt that those who are buying an SFBA as a source of secondary occasional heating are the most inclined to "shop around", possibly because the need to find a unit is not considered urgent. Those who have decided on a particular brand of SFBA on the basis of their own research, or word-of-mouth recommendations from their friends and neighbours, are likely to look for the lowest price for their unit. The 1979 Gallup survey(2) found that, although most people had already made up their minds to purchase an SFBA of a certain type by the time they began to shop, the salesperson had a considerable influence on their actual choice of unit.

One supplier with outlets in both metropolitan Vancouver and suburban/rural areas noted a greater degree of price-consciousness with his rural customers. He felt that many rural and suburban dwellers choose their home location primarily because of lower housing and related costs, and he felt that this attitude carried over to their SFBA purchases.

To some extent, most imported cast iron SFBA's could be considered as a luxury item in the SFBA market. Yet, despite their higher price, sales are not restricted to the upper income bracket. Those who are seriously committed to primary heating with wood or coal are often of lower income, and these consumers make up a large part of the sales of higher priced items.

It is interesting to note that there appears to be only a limited relationship between particular age groups and sales of SFBA's. Most SFBA purchasers are homeowners. However, they are not necessarily "first time" homeowners characteristic of the 18 to 34 age bracket. Neither are they part of the "back to the land" movement sometimes associated with the late 1960's and early 1970's. A recent article in B.C. Business (1) quoted one B.C. industry source as follows:

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(1) Residential Wood Heating Survey. Ibid, page 29
(2) Alternative Energy Today, Ibid, page 29

> A lot of people think it's younger, back-to-the-land people who are buying wood stoves, but that's not the case, ...50-60 per cent of them are over 40. A lot are semi-retired, many on fixed incomes. And a lot (who purchase) fireplace inserts are higher income who want to protect themselves from power failures and increasing hydro rates.

In the light of these comments, it appears that SFBA's have gained acceptance by a wide range of population and that heating with solid fuels has outgrown its earlier "fad" status.

Approximately 10 per cent of B.C. consumers purchase cast iron units. In many respects, this market is largely distinct from the general SFBA market. Consumers seeking a cast iron unit typically are impressed by the aesthetic appearance of the units, and some feel that cast iron possesses a greater heat-radiating capacity than plate steel. Dealers note, as well, that older customers are often more familiar with cast iron and prefer them for this reason.

Despite their lower price, cast iron units originating in Taiwan and Korea are felt by many retailers to be of dubious quality. Most of these units are not airtight, and hence are relatively inefficient. They do not bear standards or safety approval of any kind, and often manufacturers' names are obscure or unknown. In the opinion of most retailers, there is little remaining market in B.C. for these types of imported units.

Unit Size

There have been cases, in the past, where an SFBA has been operated either well beyond, or well below, its design capacity. However, there is now greater awareness among suppliers and consumers that the appropriate size of unit will depend on a number of factors including location, intended purpose, room size and frequency of use. Selection of the correct size of appliance for specific needs and circumstances is part of the services provided by fossil-fueled appliance suppliers, and SFBA suppliers are beginning to provide similar services.

6.3 B.C. Demand for SFBA's, by Type of Unit

The relative distribution of the various types of SFBA's sold in B.C. is difficult to ascertain accurately. Information received from manufacturers, distributors and dealers however, indicated that, for the province as a whole, fireplace inserts and stoves are the most popular items and account for the bulk of sales.

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(1) B.C. Business, Ibid, page 25.

The field surveys identified some regional differences in the relative distribution of the various types of SFBA's sold. However, because of the lack of regional sales data, and the wide range of different types of appliances available within the overall categories outlined in Section 4.0, it is difficult to make any specific estimates of regional sales by type of unit.

The general comments provided below nevertheless provide an indication of the regional sales pattern found in B.C.

Zero-Clearance Fireplaces

Sales of zero-clearance fireplaces were reported to be strongest in the Lower Mainland area where about 55 per cent of the province's population resides. This area also accounts for the bulk of the construction of new residential housing starts which are a strong influence on the demand for this type of SFBA. (See comments on the new residential housing market later in this section.)

Zero-clearance fireplace sales are linked primarily to the level of new housing starts especially in major urban areas in B.C., notably in the Capital Region (the second largest urban area in B.C.), Prince George, Kelowna and Kamloops. However, not all zero-clearance fireplaces are installed in new houses and distributors reported moderate levels of sales for existing houses as well.

Sales of zero-clearance fireplaces are reported to have dropped significantly on Vancouver Island over the last five years, apparently as a result of competition from stoves. One Vancouver Island dealer, for example, reported that his 1980 sales of this type of unit were only 20 per cent of his 1976 volume. In another case, a Victoria-based dealer, whose sales comprised 95 percent zero-clearance fireplaces in 1976, stated that only 20 percent of his total sales were zero-clearance fireplaces in 1979, and had declined in absolute terms.

Free-Standing Fireplaces

In the past, some multi-family dwelling complexes were provided with "acorn" type units at the time of construction since they were cheaper to install than masonry fireplaces. Generally speaking, these are being displaced by more efficient free-standing stoves or zero-clearance fireplaces in new condominium or townhouse construction.

It is interesting to note, however, that one manufacturer of free-standing fireplaces in B.C. has developed a significant export market in the southern U.S. for a major portion of his production.

Free-Standing Heaters

Free-standing airtight heaters currently dominate the Vancouver Island solid-fueled space heating market, because of their higher efficiency compared with other types of SFBA's. To a large extent, they displace zero-clearance use in both new construction and home renovations. Hence, understandably, Vancouver Island manufacturers now make primarily free-standing stoves. These units also have been installed in recreational/residential ski condominiums, such as in the Mt. Washington area.

Distributors in the Lower Mainland reported some increase in sales, during 1980, of free-standing stoves for secondary heating, notably in the Fraser Valley area. Generally, the underlying trend in demand for some airtight stoves in the Lower Mainland appears to emphasize SFBA's with a high degree of aesthetic appeal. An increasing number of buyers appear to want SFBA's which are efficient yet which offer the visible flame feature of an open fireplace.

A wide range of space heaters, of both the circulating and the radiant type, is sold in the Interior regions of B.C., and it is felt this trend will prevail in the future with an increasing demand for furnaces and add-ons.

Fireplace Inserts

Sales of fireplace inserts which are essentially retro-fit fireplace accessories, are mainly limited to regions where masonry fireplaces currently exist.

Sales of fireplace inserts have been strongest on the coast, where masonry fireplaces are most prevalent in the existing housing stock. Some degree of saturation is reported in the retro-fit market on Vancouver Island, but the Lower Mainland recorded relatively strong insert sales up to 1980. A number of dealers, who sell primarily airtight inserts and stoves, reported that 40 to 50 percent of their sales volumes in 1980 were inserts.

Purchasers of inserts typically are home-owners who wish to improve the efficiency of their existing masonry fireplaces. The availability of inserts with glass doors makes them an attractive option for use in living rooms, recreation rooms and family rooms.

Although inserts are popular in urban communities in the Interior region of B.C., suppliers in some of the areas visited during the field survey indicated that there is a growing preference for airtight stoves in rural areas.

Cookstoves

Cookstoves are not a major item in demand in any area of the province. Although these units function both as a cooking appliance and a heating system, the units are relatively expensive. Cookstove demand in the urban Lower Mainland is reported to be more "faddish" in nature, to complement "country kitchen" concepts in interior design. The units are more functional in rural areas and, possibly, in recreational uses.

Current indications suggest that, while the energy conscious household may consider solid fuel heating systems, the modern household would find it difficult to accept a return to the wood-fired cookstove. Long hours spent preparing meals in a hot kitchen do not appeal to most people and it is expected that cookstoves will remain a novelty item for most. The dramatic changes in lifestyles and socio-economic structure, that would be required for the cookstove to dominate the kitchen, are not yet anticipated.

Furnaces

Solid-fuel furnaces for primary heating are gaining in importance province-wide, as their increased efficiency and greater convenience appeals to the truly committed energy saver. The overriding concern of furnace purchasers is usually to obtain the most cost efficient heating system from their investment. It is not surprising, therefore, that wood-based furnace sales are strongest in rural areas of B.C. with abundant fuel and wood supplies.

At present, sales of solid-fuel burning furnaces in B.C. account for only a small proportion of total market demand. The number of distributors who stock furnaces, moreover, is relatively limited. Normally, the potential purchaser has examined other furnace options and there is little of the "fad buying" element which is characteristic of sales of some other forms of SFBA's. According to one distributor, most potential purchasers of primary heating furnaces appear to have "done their homework" with regard to alternatives, such as natural gas-fueled furnaces and so on, prior to reviewing the wood-burning models.

It appears that enquiries for furnaces and add-ons from potential purchasers have increased in the period 1980-81, and there are strong indications that furnaces as well as add-ons will be a growth market in the future.

6.4 Related Trends in Residential Building Designs

The availability of efficient and attractive SFBA's, and their growing acceptance by a wide spectrum of people of various age groups and income levels, appears to be having an impact on building designs. An increasing number of houses in some areas are designed to incorporate SFBA's in a variety of ways.

One particular home design features a central masonry chimney on the main floor, on one side of which a fireplace faces the living area and, on the other side, an airtight SFBA faces the dining space. Flues run side by side in a common masonry chimney. A somewhat related design, for two-storey residential construction, features one SFBA downstairs, or in a basement, in addition to the normal heating appliances.

6.5 Seasonality of Demand

SFBA sales have always been highly seasonal in B.C. The season typically commences in September, with sales increasing to January, and then decreasing towards spring. Cooler weather arrives earlier in the Interior and northern portions of the province, and the major sales season begins earlier than in the Vancouver Island and Lower Mainland areas. Over 60 per cent of all retail sales of free-standing SFBA's are reported to occur during the first month of the season.

The season is somewhat shorter for insert sales, attributed by the trade to the "last season's afterthought" nature of most purchases. Almost 85 per cent of insert sales are reported to take place in the September-December period. Manufacturers normally produce at, or above, capacity levels between August and November, in response to these market conditions.

Markets for some types of SFBA's for new construction are less seasonal. Sales to this segment of the residential market are heaviest in spring and summer, when construction activity typically peaks in the province.

Greater seasonal stability within the industry certainly would benefit most manufacturers by offering greater use of their capital investment. Workers on SFBA assembly would benefit from more continuous employment, while manufacturers would be able to avoid the need to retrain new workers each season to replace those lost to other occupations.

Some SFBA manufacturers, and some dealers, are attempting to extend the general retail season by lowering prices, undertaking additional advertising in the warmer months. Others have diversified their product range or taken on other types of work.

6.6 Projection of Future Demand for SFBA's in B.C.

The purpose of this section is to provide a projection of the most likely level of future demand for SFBA's in B.C. Given the relative newness of the industry, and the diversity of types and uses of SFBA's, the approach taken has been to examine the major determinants of SFBA demand. Consequently, potential requirements are examined under the following headings:

1. The number of existing households in B.C. with SFBA's. (This will provide an estimate of the degree to which the market may already be saturated, as suggested by some industry sources).

2. The number of existing households with a masonry fireplace likely to purchase an SFBA, namely an insert or a stove.

3. The number of existing households without a masonry fireplace likely to purchase an SFBA.

4. Future new residential construction in B.C. and the proportion of dwellings with a fireplace, SFBA, or provision for SFBA.

5. Future demand for SFBA's in commercial and light industrial applications.

Existing Households with SFBA's

There are no published statistics on the number of existing households in B.C. with SFBA's. Statistics Canada (1), however, provides separate estimates of principal types of heating equipment, principal types of heating fuel used, the number of homes with supplementary heating equipment, and so on. Data for 1979/80 are detailed in Appendix A, Tables 4-8.

Unfortunately, from the point of view of this study, the Statistics Canada data are not very helpful as they do not identify SFBA's as a separate category. Also, taking into account the apparent number of SFBA's sold in B.C. in recent years, the data shown in Appendix A, Table 5 appear to underestimate solid fuel use in the province.

The Statistics Canada estimates indicate that, in 1980, 27,000 households in B.C. used wood as their principal type of heating fuel (Appendix A, Table 4). The number of households reported as using coal or coke was negligible. The data also indicate that 39,000 households used wood, coal or coke as fuels for their supplementary heating equipment in 1979 (Appendix A, Table 7). There is no indication of the extent to which households used wood for principal and supplementary heating, but it seems likely that almost all did, since coal and coke are not readily available in B.C.

It was noted earlier, in Table 5, that approximately 71,000 SFBA's were sold during calendar 1979 and 1980 alone. Statistics Canada estimates that, in May 1980, 29,000 households in B.C. used heating stoves (the types of fuels used were not defined) as their principal type of heating equipment. Also, that a total of 40,000 households used either heating stoves, or cookstoves/ranges for supplementary heating (Appendix A, Table 5 and Table 7).

While these estimates appear low in relation to probable SFBA sales prior to 1979, it should be remembered that some of the earlier SFBA's purchased were non-airtights and an increasing number of these might have become obsolete and replaced by newer airtight models.

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(1) see Statistics Canada Catalogue 64-202 (Annual). Also, note that the 1981 Census form included a series of questions on the main type of heating equipment and fuel most used in dwellings in Canada. This may provide useful data when available. (See Appendix H)

It seems safe to assume that between 70,000 and 90,000 households in B.C. had a working SFBA (exclusive of masonry fireplaces) at the end of 1980. Taking the average, this is equivalent to about 1 in every 12 households(1) with an SFBA.

Existing Households with Masonry Fireplaces Likely to Purchase an SFBA

Statistics Canada estimates that, in 1979, a total of 386,000 homes had fireplaces, or about 45 per cent of the households in the province (Appendix A, Table 7). Details were not provided and they probably included mainly masonry with a small number of metal fireplaces. Assuming that 40 per cent of the some 80,000 SFBA's installed are inserts and 4000 of the 386,000 fireplaces are zero-clearance fireplaces then the number of fireplaces with potential for installation of inserts of stoves is of the order of 350,000.

Based on these estimates it appears that, in theory, up to 350,000 households in B.C. with masonry fireplaces could be future purchasers of SFBA's, namely inserts or stoves. In practice, however, the potential market in the existing housing stock is likely to be considerably lower than this, for the following reasons:

- Not all households with masonry fireplaces will necessarily wish to purchase an SFBA.
- Not all masonry chimneys in existing houses are used regularly or at all. Some are not suitable for SFBA installation, because of poor condition, safety hazards in surrounding materials and so on. Also, the layout and structure of many existing houses would not meet the required fire safety and installation standards without considerable and expensive modifications.

Nevertheless, it is possible that as the safety of SFBA's improves, and their public appeal increases with the new models coming on to the market, more households will consider purchase of an SFBA. The availability of fuels such as smokeless coal and suitable appliances to use these fuels may also become a factor.

While the purchase of an SFBA, as noted earlier, is not necessarily simply a question of the comparative costs of fuels, the possibility of solid fuels improving their price competitiveness relative to conventional fuels, should also be taken into account. Examination of this issue is beyond the scope of this study, but clearly it could have an important influence on SFBA demand.

For the purposes of projecting SFBA demand in B.C., therefore, it is assumed that approximately 1 in 5 of the 350,000 households with a masonry fireplace but not an SFBA, or 67,500 households, will consider the purchase of an SFBA within the next five years.

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(1) total households are estimated at 960,000 at the end of 1980 (Appendix E).

Existing Households Without Masonry Fireplaces Likely to Purchase an SFBA

Another potential market for SFBA's is in existing homes without a masonry fireplace. Statistics Canada estimated that, in 1979, there were 471,000 of such homes in B.C. (Appendix A, Table 7). The number of single family dwellings within this total is not available and it seems likely that it includes a high proportion of dwelling units in which SFBA's would be impractical or in which SFBA use would be restricted because of building code regulations and so on (eg high density multi-family dwellings).

It is assumed, when net additions to the housing stock since 1979 are taken into account, that there are currently approximately 485,000 existing homes in B.C. without a fireplace. On first glance, this appears to represent a large potential market but again it should be recognized that not all dwellings will be suitable for SFBA installation because of the factors discussed. Morever, installation costs would be higher than for houses with an existing masonry chimney.

Consequently, it is probable that the potential for SFBA sales in this market will be lower than in homes with existing masonry fireplaces. It is estimated that approximately 20,000 existing households without a masonry fireplace will consider purchase of an SFBA within the next five years.

SFBA Demand in New Residential Construction

The level of future new home construction in B.C. and the proportion of new dwellings built with a fireplace, stove, furnace or boiler are important factors in determining future SFBA demand in B.C. Within certain limits, the level of new home construction can be predicted on the basis of economic and demographic factors. Unfortunately, there is considerable variability in the proportion of new dwellings built with a masonry fireplace or SFBA in the various regions of B.C. Consequently, estimates of this have been necessary.

Fireplaces are a desirable feature to many people buying a house. A U.S. consumer/builder survey published in the Professional Builder(1) ranked fireplaces as the most desirable option among a list of items that buyers would select at additional cost. Two-thirds of those sampled ranked fireplaces as their first choice.

Although consumer preferences vary in the different regions of Canada and the U.S., it appears that there is an upward trend in the overall proportion of new dwellings which contain a fireplace. In the U.S., a Bureau of Consensus Usage Report (2) indicated that the nationwide average for all new housing containing one or more fireplaces was 62 per cent of all new units constructed. The report also indicated that this represented a 50 per cent increase over the previous eight years. Equivalent survey data are not available for B.C., but it appears that a fairly large number of builders in the province, by tradition, include fireplaces during construction or provide them at the option of the house buyer.

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(1) Professional Builder, December 1980.

(2) Wood 'n Energy, June 1981. "Lack of Industry Initiative Can Slow Demand". Bureau of Census Usage Report (1979).

In many cases, these were standard design masonry fireplaces. However, a growing number of designers and builders are now, as a rule, substituting SFBA's for masonry fireplaces. One consideration is that SFBA's, such as zero-clearance fireplaces, are cheaper to install than most masonry fireplaces and are very suitable for multiple unit dwelling construction since they may be built directly into the wooden framework and do not require concrete foundations. Most zero-clearance fireplace dealers provide an installation service which helps in shortening the contractor's building schedule. At a price of approximately $900 to $1,500 for an installed zero-clearance unit, compared with a reported cost of between $2,500 and $5,000 for masonry construction, the zero-clearance unit clearly can be an attractive choice for the builder.

Wood 'n Energy(1) magazine reports that, in the U.S., home builders account for as much as 55 to 75 per cent of all zero clearance and free-standing fireplace sales. In B.C., however, the demand for free-standing fireplaces is relatively limited. Demand for free-standing fireplaces (of the "acorn" type) is also related to the level of new housing construction. However, these units compare to masonry fireplaces in terms of efficiency and have lost popularity in colder climates.

Many of the SFBA's available today are aesthetically pleasing and have the added advantage of promoting an image of energy-efficiency. In this sense, they are an added "feature" which frequently helps to sell the house to a prospective buyer. New home buyers place varying degrees of importance on (a) the need for an aesthetically pleasing appliance which will create a relaxing, romantic or family-home atmosphere, and (b) an appliance which can be used for heating.

Although the efficiency of zero-clearance fireplaces is lower than that of stoves, it is often about double that of conventional masonry fireplaces, while still maintaining the fireplace atmosphere in a room. In addition, urban dwellers tend to find the zero-clearance fireplace more aesthetically pleasing in appearance than a stove.

Another principal type of SFBA installed in new residential housing in B.C. during construction is the heat-form. The basic principle of the heat-form is to act as a means of improving the efficiency of conventional masonry fireplaces. When heat-forms are installed, they are normally part of an overall fireplace and chimney system. The provision and installation of these types of units, in effect, is an integral part of the home building trade, and demand for these units is closely tied to the overall level of new residential construction in the province.

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(1) Wood 'n Energy, June, 1981. Markets/Trends. "Fireplaces: Only One Way to Go".

In addition to the types of SFBA's already mentioned, there is a currently limited, but growing, demand in the new residential construction market for other types of "energy efficient" SFBA's. These are installed during construction by the builder, normally on a custom basis. Examples include stove/fireplace combinations, and furnaces and space heaters.

Although demand for SFBA's for new homes in B.C. is related to the overall level of economic activity and new residental construction in the province, a strong correlation between total consumption of SFBA's for all uses and new construction levels cannot be expected. Housing starts in B.C. and estimated consumption of SFBAs for the period 1978-81 are tabulated below.

Year	Housing Starts in B.C.1/ # units	Estimated Total Consumption of SFBA's # units
1978	28,618	not available
1979	27,345	39,000 2/
1980	37,546	31,900 2/
1981	41,585	25,000 3/

Sources:

1/ Appendix A, Table 9.

2/ Table 5.

3/ Consultants' estimate... see demand forecast later in this section.

The table shows a peak level of SFBA consumption in 1979, in excess of the number of housing starts. While total housing starts in the province increased by more than 37 per cent from 1979 to 1980, the estimated total consumption of SFBA's declined from 39,000 to 31,900 units. Housing starts increased again in 1981, but estimated total SFBA sales declined once again.

Unfortunately, SFBA sales by type of unit are not available in detail. Consequently, it is not possible to ascertain the quantity of SFBA's sold for use in new construction. It is possible then, that sales of types of SFBA's usually installed in new residences, such as zero-clearance fireplaces, could well have increased with increased levels of new residential construction but this would not be indicated by correlating with total SFBA sales.

When urban single-family starts are compared with estimated total consumption of SFBA's, the relationship similarly shows little if any direct correlation as shown below.

Year	Single Family Starts in Urban Areas[1] # units	Apparent Consumption of SFBA's # units
1978	12,776	not available
1979	14,057	39,000[2]
1980	17,434	31,900[2]
1981	12,286	25,000[3]

Source:
[1] Appendix A, Table 10.
[2] Table 5
[3] Consultants' estimate... see demand forecast later in this section.

In summary, it seems reasonable to conclude that changes in the level of housing starts in B.C. influence sales of the types of SFBA's used in new construction. However, total sales of SFBA's of all types is dependent on a number of factors such as overall economic activity, the type of housing built, safety considerations and comparative fuel costs.

Projections of new housing starts in B.C. over the next five years, for the purpose of partially forecasting SFBA demand, are shown below.

Year	Projection of Total Starts in B.C. # Units
1982	28-30,000
1983	32,000
1984	36,000
1985	35,000
1986	35,000

Note: 1982-86 av. = 33,400

Sources: Housing Quarterly. Published by the B.C. Ministry of Lands, Parks and Housing, prepared by Woodbridge, Reed and Associates Ltd. and Clayton Research Associates Ltd. (1982 projection), plus Woodbridge Reed forecast for subsequent years.

On the basis of the projected housing starts levels, it is anticipated that an average of 12,000 SFBA's will be required in new housing each year over the period 1982-86 or a total of 60,000 units. This is based on the assumption that, on average over the period, approximately 1 in 3 housing starts will contain an SFBA installed during initial construction or will have a masonry fireplace installed, or provision for an SFBA.

SFBA Demand in Commercial and Light Industrial Applications

The demand for SFBA's, either for space heating, water heating or aesthetic purposes in this market is difficult to estimate. It is expected, however, to be a growth market over the longer term as a result of the increasing availability of suitable models on the market, the comparative costs of fuels and, possibly, the wider use of combination fuels, particularly wood/coal mixtures. The development of the latter fuels could significantly increase SFBA demand in this market, although over the short term their impact is likely to be restricted by supply factors. Use in restaurants and sales rooms for aesthetic purposes is a possibility.

Consequently, it is projected that over the next five years, an average of 200 SFBA units per year could be required, or a total of 1000 units over the next five years. Much of this market growth is expected in the 1984-86 period.

6.7 Summary of B.C. Demand Projections

The estimates of sales of SFBA's indicate that annual demand is sensitive to the level of overall economic growth and per capita disposable incomes in the province. Table 6, which summarizes the Consultants' estimates of annual demand for SFBA's in B.C., has been adjusted for anticipated future levels of real economic growth in the province. The five year demand totals discussed earlier remain the same, but now reflect the Consultants' estimates of economic growth from year to year over the forecast period.

It is forecast that, over the next five years, the demand for SFBA's in B.C. will average 29,700 units per year. Much of the demand (59 per cent of the total) is expected to be in the installation of SFBA's in existing homes, particularly those already with a masonry fireplace. Inserts are expected to remain popular as a fireplace retrofit item. Also, there is likely to be good demand for zero-clearance fireplaces, particularly from new construction and home-improvement and renovation work. Airtight stoves, notably those which combine efficiency and multiple use are expected to account for a fairly high proportion of overall sales in this market.

It is forecast that new 1982 housing starts in B.C. will fall significantly below the levels of the past two years. Consequently, the demand for zero-clearance fireplaces, heat forms and other units installed during construction is likely to be below the average expected for the next five years. A housing market recovery in subsequent years, would result in an improvement in this market. As noted earlier, growth in demand for SFBA's in commercial and light industrial uses has significant longer term potential, but is expected to be relatively low over the next few years.

Currently, there are uncertainties regarding the future cost of conventional home heating fuels. While the general direction of the upward trend has been established as a result of the National Energy Program, future price differentials

TABLE 6

PROJECTION OF DEMAND FOR SFBA's IN B.C.

((No of Units)

	ESTIMATES OF ACTUAL CONSUMPTION			PROJECTIONS OF DEMAND						
	1979	1980	1981	1982	1983	1984	1985	1986	5-Year Average	5-Year Total
In Existing Houses				15,000	17,000	20,500	17,500	17,500	17,500	87,500
In New Houses	- Not Available -			10,000	12,000	14,000	13,000	11,000	12,000	60,000
In Commercial/Light Industrial Uses*				100	100	200	300	300	200	1,000
Total SFBA Demand in B.C.	39,000	31,900	25,000**	25,100	29,100	34,700	30,800	28,800	29,700	148,50

Source: Consultants' Estimates

* Demand in this sector could be considerably higher, as noted in the text.

** Consultants' estimate based on discussions with trade sources.

between conventional fuels and solid fuels are unclear at this time. This uncertainty, and any technological and design changes in SFBA's, make it extremely difficult to provide accurate forecasts based on comparative fuel costs.

Another factor of uncertainty is the possibility that a natural gas pipeline may be built from the Mainland to Vancouver Island. The latter area accounts for a high proportion of all SFBA's sold in B.C. At the present time there are no clear indications whether or not a pipeline will be built, but if it is built, it seems likely to result in a decrease in demand for SFBA's in this area.

7.0 EXPORT MARKET POTENTIAL

7.1 SFBA Demand in Other Parts of Canada

Statistics Canada(1) estimates that, in 1980, a total of 239,000 households in Canada used wood, coal or coke as fuel for their principal heating equipment. In the majority of cases (over 90 per cent), wood was used rather than coal or coke. Detailed data on solid fuels used for secondary heating purposes are not available, but Statistics Canada estimates that, in 1980, at least 500,000 homes in Canada were at least partially heated with wood.

On the basis of estimated sales of SFBA's in recent years, it appears that these estimates may be low. A number of trade sources (2) indicated that, in 1979 alone, Canadians purchased about 200,000 wood stoves and furnaces - twice as many per capita as the nearly one million units sold in the U.S. Demand for SFBA's in Canada during 1980 was lower than the previous year, and it is estimated that total sales were in the range of 155,000 to 165,000 units.

Part of the decline in sales during 1980 has been attributed to the sharply lower level of new residential construction activity. It seems likely, on this basis, that 1981 sales of SFBA's may have continued to be adversely affected by the relatively low level of housing starts. In Canada, the most recent peak in house building activity was 1976, when over 273,200 units were started. Activity declined significantly through 1980 when only 158,600 units were started. Summary data are provided below.

Canada: New Residential Housing Starts
Thousands of Units

Year	#	Year	#
1970	190.5	1976	273.2
1971	233.7	1977	245.7
1972	249.9	1978	227.7
1973	268.5	1979	197.0
1974	222.1	1980	158.6
1975	231.5	1981	178.0

Source: Canada Mortgage and Housing Corporation (1981)

In recent years, Western Canada has accounted for a high proportion of total new residential housing starts in Canada. (43 per cent in 1979, 49 per cent in 1980 and 51 per cent in 1981). This is one factor which may account for why per capita SFBA sales in the west have been higher than in central and eastern Canada. Other factors included a higher level of economic growth and the availability of fuelwood, especially in B.C.

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(1) see Appendix A, Table 8.

(2) see, for example, Canadian Renewable Energy News (October, 1980) 'Stove Market Soft Except in B.C.' and 'Conflict with Stat Can'.

There have been considerable variations in SFBA demand between the various provinces. Moreover, it appears that demand in some areas may be approaching a level of saturation. In 1980, The Globe and Mail reported (1) one industry source in New Brunswick as saying:

> "there is more saturation (in the markets) than people realize ... take Prince Edward Island where 70 per cent of the homes have either one or two wood burning units now. Where are you going to get the big rush again?"

A study carried out by the Nova Scotia Research Foundation (2) examined the wood heating industry in the three Maritime provinces. A spokesman commented that:

> "the market is limited and there is strong competition from U.S. and Norwegian imports. I think (the market) is peaking now and the only growth you'll see is tied to new construction".

CREN(1) reported a Newfoundland wood heat expert as saying that because of lower incomes in Newfoundland, the low cost end of the market does well and "it's almost impossible for people who want to specialize in quality stoves to compete, because the area's large distributors will sell their stoves anywhere". This same source estimated that about 15,000 stoves a year are sold on the island, where the majority of forests are softwoods.

Some of Canada's major woodstove foundries are located in the Atlantic region, and many of the manufacturers market SFBA's in the U.S., Europe and throughout Canada. However, in 1980, Newfoundland had no woodstove manufacturers as such and there were no specialty stores in the retail trade. Instead, SFBA's were marketed through hardware stores and lumber yards.

The Maritime provinces have a fairly substantial and well established SFBA manufacturing industry, and the region has traditionally been an important wood heating area. Wood 'n Energy(3) reports that the region contains the nation's highest proportion (49 per cent) of pre-1945 housing, almost all with masonry chimneys. Recently, however, stoves reportedly accounted for 90 per cent of SFBA sales.

Ontario and Quebec which together account for about 60 per cent of Canada's population, have been important markets for SFBA's. Dealers report that the new housing market for SFBA's in these areas is normally strong, but that the downturn in economic activity over the past few years has had a severe impact on SFBA sales. Factory built fireplaces typically are popular and increasingly appear to be displacing masonry fireplaces in new construction. A large proportion of houses have masonry fireplaces and much of the housing stock has been in existence for more than fifty years. Consequently, insert sales have increased in popularity.

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(1) The Globe and Mail December 12, 1980. 'Wood Stove Producers See Harsh Winter for Industry'

(2) Canadian Renewable Energy News (CREN) (October, 1980) 'Wood Heating Stronghold Changing Directions'

(3) Wood 'n Energy (June, 1981)

Recently, however, it appears that some retailers in eastern Canada are discouraging insert buying because of reports of safety problems and the apparent comparative inefficiency of many of this type of SFBA. Wood 'n Energy report that:

> "even as august a body as the Housing and Urban Development Association of Canada (HUDAC) which represents Canadian Builders and architects... would not recommend an insert"(1)

The SFBA manufacturing industry in Ontario and Quebec grew very rapidly in the late 1970's, and it is estimated (2) that, in 1980, Ontario alone had 60 manufacturers, or about 30 per cent of Canada's estimated total of 200. A similar situation of rapid industry growth is reported in Quebec, where at least ten new manufacturers of steel plate stoves reported as commencing operations during 1980. Many of the larger firms export SFBA's to the U.S. where Canadian built units are priced competitively with U.S. produced SFBA's.

Wood is scarce in Alberta and in the Prairies and in the large cities there are few fireplaces. When wood was plentiful, most homes had wood or coal stoves and furnaces which are now removed. Only expensive homes have wood fireplaces. Some newer ones have gas-fired fireplaces.

A report in Building Supply Dealer (July 1978) commented:

> "In the Prairie provinces, Alberta, Manitoba and Saskatchewan, they (prefer) factory built zero clearance units. Cast iron and free standing fireplaces never really did catch on out there, they prefer a modern-looking open fireplace if anything ... a decorative prestige feature rather than a source of secondary heating."

7.2 Existing SFBA Demand in the U.S.

A study for the U.S. Department of Energy(3) estimated that sales of wood burning stoves in the U.S. rose from 160,000 units in 1972 to 1,150,000 units in 1978. In addition, the study estimated that 50,000 furnaces and boilers, 650,000 built-in zero clearance fireplaces and 150,000 free standing fireplaces were sold in 1978. Construction of masonry fireplaces during the same year was estimated at 650,000 units.

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(1) Wood 'n Energy (June, 1981) 'Canada's Divided Fireplace Markets'.
(2) CREN - (October 1980) ibid.
(3) Booz Allen Inc. 'Assessment of Proposed Federal Tax Credits for Residential Wood Burning Equipment (March 1979)

More recent data were not available, but various trade estimates indicate that SFBA sales peaked in 1979, when new housing starts in the U.S. were in the region of 1.8 million units. Subsequently, U.S. housing starts have dropped to 1.3 million and 1.1 million, in 1980 and 1981 respectively. The 1981 level of building activity was the lowest since 1946. As new housing is a major determinant of SFBA demand in the U.S., the housebuilding recession has had severe impact not only in reducing demand but in contributing to a large number of bankruptcies in the industry.

According to Wood 'n Energy(1), most of the U.S. industry's troubles are tied to the housing market. Since builders can account for as much as 55 to 75 per cent of zero-clearance and free-standing fireplace sales, manufacturers have been devastated by the slump. Insert sales, nevertheless, seem to have kept relatively buoyant in some areas.

Remodeling projects involving fireplaces are also reported to have tapered off. According to Housing Industry Dynamics (2), the number of remodelling jobs including a fireplace or stove dropped from 6.7 percent to 5.7 per cent of the total in 1981.

Predictably, the U.S. market for SFBA's varies considerably from region to region, in the types which are most popular. Most of the recent new housing construction has taken place in areas where fuel efficiency is not a high priority, notably in Florida, California and Texas. The Sun Belt also has a higher proportion of homes with fireplaces than most other areas in the U.S. It is estimated that 60 per cent of new homes in this region are built with a fireplace, an increase from 50 per cent in 1975.(3)

In contrast, only half the new houses built in the North East have one or more fireplaces. More and more builders in this area appear to be omitting the fireplace option. Generally, suburban communities have a high preference for efficient SFBA's and many utilize inserts only for supplementary heating. Stove sales are reported to be highest in rural areas, followed by inserts. Generally speaking, the zero-clearance fireplace and free-standing heater market remains highly fragmented. It is reported, for example, that several of the leading manufacturers offer over two dozen different free-standing heater models.

Manufacturers of inserts also produce a wide range of units, but are faced with the prospect of making even more in order to fit an assortment of different fireplace sizes.

On a regional basis, the major demand characteristics for SFBA's in the U.S. are:

North East

- Efficiency is a primary purchasing characteristic.
- Wood/coal options sell well.

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(1) Wood 'n Energy (June 1981)
(2) see (2) above
(3) Wood 'n Energy, Ibid.

- Overall demand is growing only slowly.
- The demand for zero-clearance and free-standing fireplaces is fairly weak.
- Insert sales are comparatively strong, so too are efficient heaters.

North Central

- Demand for SFBA's is increasing, as conventional fuel prices escalate.
- Zero clearance fireplaces are popular in new housing.
- The area accounts for a fairly high proportion of U.S. starts.
- Insert sales are comparatively strong.

South

- The warmer climate means that homes generally need little heating: however, cooler winter weather can noticeably increase SFBA sales.
- Demand for efficient fireplaces and inserts is much lower than for SFBA's with a high visual appeal.
- The remodelling market remains fairly strong in the summer.
- Stove demand is comparatively limited.

West

- This is the major growth market in the U.S. and, in recent years, has accounted for a high proportion of new housing starts.
- Efficiency is a major purchasing characteristic in the Rocky Mountain states.
- Up to 3 out of every 5 SFBA sales in some areas of Idaho, Montana and Wyoming are fireplace inserts.
- Zero clearance fireplaces are significant in New Mexico and southern California, with emphasis on SFBA's with a high visual appeal.

Alaska

- Efficiency is an essential characteristic of SFBA's sold in the area.
- This has been a growth market for some SFBA producers in B.C. who have been able to sell at a very competitive price to alternative suppliers in the U.S.
- The do-it-yourself market is quite strong.
- Transportation problems to remote areas mean that lower-weight and/or home-made units are sometimes favoured.

7.3 Existing B.C. Export Sales(1)

Manufacturers and distributors in B.C. are estimated to have exported approximately 8,700 units in 1979 and 6,500 units in 1980. These included free-standing fireplace exports to the southern U.S. where, as noted earlier, high visual appeal is considered more important than efficiency by most purchasers. Also, the export volume reflects sales of B.C. produced airtight stoves in Alaska and, to a lesser extent, to Washington and Oregon. A variety of SFBA's are reported to have been sold in Alberta and a limited number also to other Prairie provinces.

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(1) defined as exports from the province, excludes SFBA's imported for re-export.

Generally, it appears that exports of SFBA's from B.C. reflect successful marketing efforts on the part of individual manufacturers rather than being the result of any significant, unique features in SFBA's designed in the province. In addition, location is an important consideration, as the weight of some of these units can involve substantial freight costs if they are shipped any distance.

The most successful exporters to Alaska, therefore, appear to be firms located in the Interior Region of the province. Correspondingly, some southern Interior region manufacturing firms have developed markets in Alberta, Washington and Idaho. There are no reported exports of SFBA's from Vancouver Island, and producers in the Lower Mainland apparently export mainly to the Pacific North West.

7.4 Competitive Factors

Over the past few years, B.C. manufacturers have been able to penetrate U.S. markets in competition with local suppliers, whereas the reverse generally has not been true. Zero-clearance fireplaces are an exception as they are not produced in B.C. There are two main reasons for B.C.'s competitive position:

1. Tariff Differentials(1)

The tariff differential favours Canadian penetration of the U.S. market rather than U.S. entry into Canada. Duty of 4.2% is charged against American imports of Canadian SFBA's, compared with 18.1% applied to Canadian imports of U.S. manufactured units.

2. The Canadian/U.S. Exchange Rate

Over the past few years, the Canadian dollar's value in U.S. funds has ranged between 82 and 86 cents. This can give a substantial competitive advantage, unit for unit, to Canadian exporters, offsetting to some extent any increased transportation costs and the tariff in shipments to U.S. markets. Nevertheless, it should be recognised that, in the absence of B.C. produced units having any unique selling features, local suppliers in the U.S. probably are able to compete fairly keenly with imports, in most areas, by virtue of their lower transportation costs.

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(1) Canada Customs advises that the relevant tariff item is #44300-3

The fairly rapid rate of growth of Canadian SFBA exports, as a whole, in 1978 and 1979, appears in retrospect to have been due also to the existence of a rapidly growing U.S. demand which could not be fully met by supplies from U.S. producers. It is clear that a combination of subsequent fairly sizeable manufacturing capacity increases, in both the U.S. and Canada, and a sharp decline in demand, has led to overcapacity in most regions and severe price competition in almost all areas.

During 1981, few manufacturers or distributors in Canada reported any significant level of U.S. export sales, despite the exchange rate advantage. Obviously any substantial increase in the Canadian dollar's value in U.S. funds is likely to reduce the potential price competitiveness of B.C.'s exports of SFBA's.

With regard to B.C.'s competitive position in relation to other Canadian suppliers, it is relevant to note that a reasonably large proportion of SFBA's imported into B.C. include units produced in Manitoba, Ontario and other eastern provinces. Some of these imported SFBA's have established a "brand-name following" in B.C. and this appears to be an important sales factor.

Correspondingly, in export sales from B.C. to other provinces, market development is again a question of creating a distinctive brand-image which will appeal to potential purchasers. Price competition would almost certainly be the most important factor if a range of SFBA's produced by different manufacturers had no distinguishing characteristics.

7.5 Outlook for Export Demand

A variety of factors make it difficult to quantify future export demand for SFBA's produced in B.C. Firstly, the lack of design standardization, perceived or otherwise, frequently means that competition is not based solely on price. Also, the fragmented geographical nature of the industry and the large number of potential, or occasional producers, prevents any meaningful assessment of regional supply/demand balances. More to the point, these factors frequently make it difficult to identify areas where there is undercapacity which would generate opportunities for sales of SFBA's produced outside the region.

It was pointed out earlier that, currently, most U.S. markets for SFBA's are suffering from a combination of low demand and overcapacity. In the western U.S., this is reported to be an acute problem and has resulted in significant increase in SFBA business failures over the past year or two. With the exception of cases where specific market needs for a particular type of SFBA are identified the major opportunities for SFBA exports to the U.S. are likely to be in the North West including the mountain states.

The wider market area of the Pacific North West contains an estimated 1981 population of around 13.8 million persons. Based on an average of 2.6 persons per household, a total market of around 5.3 million households is indicated. Summary population data are provided below.

Pacific North West Population Estimates (1981)
Millions (rounded)

Alaska	0.4	Montana	0.8
Alberta	2.1	Oregon	2.7
British Columbia	2.6	Washington	4.2
Idaho	1.0		

Alaska: Some B.C. suppliers appear to have developed a market niche in this area, where they combine the competitive advantage provided by the exchange rate differential with the geographical advantage of comparatively low transportation costs.

Alaska has a population of approximately 400,000 persons and, consequently, the overall market size is relatively limited. A Washington based manufacturer commented that, although exporters from northern B.C. appear to have a competitive edge over neighbouring U.S. suppliers, he felt that the market would become saturated over the next few years because of an increase in the availability of locally produced supplies.

Nevertheless, as efficiency is an important criteria in this market it appears possible that B.C. manufacturers and distributors who can offer this type of unit may be able to compete fairly successfully during buoyant markets when demand seems likely to exceed local supply capabilities.

Alberta: Over the medium term, it appears that increased levels of housing starts in Alberta will necessitate SFBA imports from outside the province, particularly of airtights with high visual appeal and zero-clearance fireplaces, if demand materializes as noted earlier. However, competition from gas-fired appliances is likely to be strong.

In terms of total population, Alberta is about 80 per cent of the size of B.C. (approximately 2.1 million persons or about 800,000 households). It is reported that the number of houses with masonry chimneys is comparatively low, as reflected in the lesser importance of insert sales compared with other provinces.

Locally available fuelwood supply is limited in the densely populated parts of Alberta (i.e. the southern half of the province, excluding the foothills) but the western and northern parts have fairly substantial supplies of mixed coniferous and aspen timber which is suitable for wood stoves. In addition, coal is produced in Alberta and this could become a significant factor in future SFBA sales in the province. All of these solid fuels, however, face competition from relatively favourably priced natural gas which is widely available throughout the province.

The table below summarizes housing starts in the province since 1970. It shows that new housing activity in the province rose fairly rapidly in 1975 through 1978; more than doubling during this perod over the 1974 level of 19,000 units. This reflected the higher levels of real economic growth in the province, associated with the expansion of the oil and gas industry.

In 1979, starts fell to 40,000 units, and a further decline was recorded during 1980 when starts totalled 32,000 units. The outlook for new housing starts in the province during the period 1982 - 1986 is for activity to recover from the 1980 level to around 1978/79 average levels during periods of peak demand.

Alberta: New Residential Housing Starts
Thousands of Units

Year	#	Year	#
1970	16.3	1976	38.8
1971	25.6	1977	38.1
1972	22.5	1978	47.9
1973	21.0	1979	40.0
1974	19.0	1980	32.0
1975	24.7	1981	38.5

Source: Canada Mortgage and Housing Corporation (1981)

Bearing in mind the competition from natural gas there could be growing opportunities for B.C. based manufacturers and distributors of SFBA's in Alberta during those periods. In particular, sales to the builders market could prove worthwhile to those who are willing to undertake business development in the field by talking directly to builders and sub-contract trades (e.g. masonry fireplace contractors).

Currently, B.C. Interior producers probably can offer SFBA's at a delivered price at least competitive with eastern suppliers.

Washington/Oregon

This market region contains a combined population of nearly seven million persons, or more than two and one half times the population of B.C. As noted earlier, the region has a sizeable manufacturing section producing SFBA's and is reported to serve a large part of its own needs for the various types of units. The region exports units to B.C. and to other Pacific North West markets, but it also imports SFBA's from B.C. Growth in export shipments to B.C. is reported to have been substantial in the mid to late 1970's, but increasingly took the form of franchized manufacturing operations in B.C.

Consumption data for the region are not available, but a recent survey(1) provides some useful statistics on the use of wood in areas of the state of Washington. The report provides useful reading for exporters to the region. Its main highlights are as follows:

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(1) Puget Sound Power & Light - Residential Wood Heating Survey (1980)

- 25 percent, or 82,500 households(1) in the study area, reported having a woodstove, and an additional 12 percent indicated that they have a fireplace insert.
- 35 percent of the woodstoves, and over 60 percent of the fireplace inserts, were purchased within the year prior to the survey.
- Of the single family homes with a fireplace only, over 39 percent reported having a glass door on their fireplace.
- Approximately 17 percent of the respondents indicated they were very seriously considering obtaining a woodstove or fireplace insert.
- Of the households who already have a stove or insert, 60 percent reported that efficiency was the major factor influencing their decision to obtain a wood heating unit.

Overall, the survey provided some evidence that the penetration of wood into the residential home heating market may continue for the next several years. The longer term demand outlook, however, is likely to depend on many of the same factors as were identified in the section on B.C. The cost of conventional home-heating fuels is likely to be a significant factor in this area.

Montana/Idaho

The total combined population of Montana and Idaho is estimated to be 1.8 million persons, representing probably around 700,000 households. SFBA production and consumption statistics for the area were not available. B.C. manufacturers reported that occasional sales had been made to each of the states.

It seems likely that B.C. manufacturers and distributors who can establish a strong dealership link in this area may find it to be a worthwhile export market. The major sales emphasis should be on aesthetically pleasing and efficient SFBA's of airtight design.

SFBA Sales to Eastern Canadian Markets

Except where "brand loyalty" to a particular design of B.C. produced SFBA can be established, it is believed that there are only limited sales opportunities in this market. Competition from locally produced SFBA's is almost certain to be strong, and B.C. manufacturers will have to compete with established manufacturers/dealerships.

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(1) survey data were extrapolated to over 300,000 single family homes served by Puget Sound Power & Light in the State of Washington.

In this context, it should be noted that major Canadian producers of airtight SFBA's are already well established in eastern Canada, and the demands of eastern Canadian consumers, in most cases, appear to be adequately met by them. Eastern Canadian producers are currently reported to be operating well below capacity levels, indicating that B.C. production will have a difficult time penetrating the market over the near future. High transportation costs to the markets are a major deterrent which effectively will prevent B.C. producers from competing in the eastern market.

8.0 POTENTIAL CONSTRAINTS TO INDUSTRY GROWTH

8.1 Fire and Safety Hazards

The majority of SFBA's pose no fire or safety hazards when installed and operated according to manufacturers' instructions and local safety and building codes. Within North America, there are, however, some exceptions to this, attributable to poor product design and, in some cases, problems due to inappropriate flue piping and infrequently cleaned chimneys. Authorities report that, as a result of the growing popularity of woodstoves, there has been a significant increase in the incidence of chimney fires.

The primary responsibility for SFBA safety rests with the designer and manufacturer. Significant improvements have been made in recent years in design and safety features, in the provision of installation and operating instructions, and education of dealers, retailers and consumers. An increasing number of manufacturers now have their appliances tested by certifying organizations to meet recognized product safety standards. It was noted earlier that, of the manufacturers identified in B.C., approximately 80 per cent have received certification on at least some of their products. In addition, testing of SFBA's in accordance with ULC or CSA standards is mandatory across Canada, for eligibility of wood burning appliances under the Canadian Oil Substitution Program(COSP).

Considerable publicity has been given to the importance of the safety of SFBA's and the risks of badly designed, installed and operated appliances. (1) As a result, public awareness of these issues has increased and many buyers now will purchase only certified appliances as assurance of safety and a recognized and acceptable standard of design and workmanship. On the other hand, there are still buyers who simply are not aware of the potential dangers of badly designed, installed and operated units.

Many manufacturers and suppliers have adopted a professional approach to promote product design standards and safety, through trade associations such as the B.C. Chapter of the Canadian Wood Energy Institute (CWEI). There is considerable evidence that the industry is achieving substantial progress in this regard. Judging from the emphasis given to these issues at conferences, in trade publications and in manufacturers' product literature, it appears that much is being done in educating members of the industry and the public.

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(1) see for example: Province of British Columbia - Guidelines 'Safe Installation & Use of Solid Fuel Burning Appliances' No. 79-4(1979) and 'An Update on Chimneys, Airtight Stoves, Fireplace Inserts and Glass Doors' No. 80-4, published by the Office of the Fire Commissioner, Ministry of the Attorney General (1980).

see also: Underwriters' Laboratories of Canada 'What is the Significance of the ULC Label? (excerpt from ULC News, January 1974)

In B.C., the installation of SFBA's is regulated by the Building Regulations of British Columbia and the Regulations Governing the Construction, Installation and Maintenance of Chimneys, Fireplaces, Smoke Pipes and Furnace Chambers (pursuant to the Fire Services Act). As noted in the footnotes earlier, public education has been carried out actively through booklets and safety literature issued by the Government of the Province of British Columbia.(1)

Despite the emphasis given to public education, authorities report that improper installation is the most frequent cause of SFBA related fires. One Atlantic region insurance underwriter suggests that, in his opinion, probably 90 per cent of the wood burning units covered by his company are improperly installed.

Unsafe installation and poor operating practices are blamed for three-quarters of SFBA related fires, according to an Insurance Bureau of Canada spokesman. Ontario alone experienced more than 1,100 wood-heat related fires in 1980, a significant 27 per cent increase over 1979 levels. Damage is reported to have totalled $6.4 million in 1980, 42 per cent over 1979's $4.4 million figure. The potential for fire damage is expected by some in the trade to continue to increase. This is attributed to drying of the structural wood-framing which surrounds units installed two to three years ago.

Part of the problem can be attributed to the 'do-it-yourself' nature of most SFBA installations. Dealers estimate that close to 9 out of every 10 units in 1978 were installed on a do-it-yourself basis. Since then, this proportion has declined, but it remains true that the majority of units are still installed by the consumer. Although fire marshalls' guidelines and building code specifications are usually provided by the supplier, and most units are accompanied by manufacturer's specifications and directions, there is no assurance that any of these will be followed by the installer.

Dealers stress that even well-intentioned customers who intend to produce a safe installation may become confused with the jargon of installation codes. The need for clearances from combustible surfaces must often be explained in detail by knowledgeable dealers. The trade as a whole, however, feels that not all dealers have the knowledge or experience necessary to adequately advise the consumer on safety aspects of SFBA. More recently a practice has been adopted by some dealers of referring customers to contractors who have some training in the installation of SFBA.

Urban SFBA buyers tend to be in a better position than rural consumers to obtain professional help from the SFBA trade in installing the unit. Even so, the assistance itself may be inadequate. Manufacturers may train members of the retail trade in the rudiments of installation of their product. Dealers may provide installation to the customer, but the knowledge and experience of the installer is not necessarily assured. There is currently no standard of proficiency required for installers. CWEI has recognized this problem and is working on a course to accredit SFBA installers.

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(1) see also: Canada Housing and Mortgage Corporation 'Heating with Wood-Safely' and various consumer and trade magazines such as 'Consumer Reports' October 1981.

Given the potential for both SFBA owners and trade installers to err, there is considerable weight of opinion that the potential fire hazard can be minimized by inspection of completed installations. A ULC study, released in October 1980, found that less than 25 per cent of the installations involving chimney fires were inspected by the appropriate authorities. Insurance agencies report that, although coverage requires "correct installation" of SFBA units, they normally assume that routine building inspections will ensure that this is done. The installations are not usually checked further by the insurers. Moreover, as building regulations may not be actively enforced in all instances, some installations may not be inspected at all.

Although standards ultimately can be enforced in the manufacturing and installation phases, this is not the case with regard to the day-to-day operation of an appliance. While most SFBA's appear to be operated safely, the incidence of chimney fires clearly indicates that many users are not aware of correct operating practices. In order to produce a longer lasting fire, users may resort to air-starved slow burning. This leads directly to excessive creosote formation over time which, unless regularly removed, may cause a chimney fire.

Manufacturers often stress the length of the burn as a selling feature of their appliances. However, they frequently fail to point out that slower burning fires, especially in the early stages of the fire, result in higher rates of creosote formation. Apart from creosote problems, the analysis mentioned earlier of 1,000 reported chimney fires by the ULC, observes that many incidents involved overfiring of the appliance, or inappropriate firing with paper or other highly combustible and high heat-releasing fuels.

Problems relating to SFBA use have received considerable publicity and prompted authorities to act from time to time in the interests of public safety. In B.C. during 1979, several problems with regard to Class "A" chimneys came to light. The severity of the creosote problem was underlined and caused considerable concern. As a result, in late 1979, the A-vent chimney was banned for a short period of time which undoubtedly affected sales of SFBA's, and their public image. Many in the industry, however, now feel that most of the problems have been overcome by improved product design, and that potential safety problems can be avoided through better education of the user. Discussions with members of the industry indicate the following additional points.

- Consumers' experience with uncertified, imported cast iron units has shown that some units are unsatisfactory in terms of both safety and performance. Consumers who choose to upgrade their existing inadequate units, perceive certification as some assurance of satisfactory performance.

- In the initial enthusiasm over SFBA's, some inferior products were placed on the market by opportunistic manufacturers. Certification protects the purchaser from units of very low quality.
- Most manufacturers, whose units are CSA or ULC certified, are more likely to be considered as "serious" manufacturers who are likely to be available to service their product should the need arise.
- Most consumers wishing to take advantage of the COSP programme are made aware that they must purchase certified units. Certification thus gains credence.

Overall, it appears that SFBA sales potential, not only in B.C. but elsewhere, will be enhanced if consumer suspicions of poor construction, performance, or potentially unsatisfactory service can be allayed. Some manufacturers of SFBA's, whose own products are certified, are promoting the demand for certified merchandise by stressing certification as a selling feature. They recognize that they can improve their competitive position over manufacturers whose products are not certified. Manufacturers of factory-built chimneys also are active in establishing, with certification agencies and approval authorities, product standards and safe installation practices.

The improved safety levels, nevertheless, involve higher costs which inevitably must be reflected in product prices. The cost of certification varies within North America but, typically, initial costs of between $3,500-$10,000 for each SFBA type have been quoted by producers, when company time and indirect labour costs are taken into account. In addition to this, certifying agencies charge an annual service charge of about $200.

Increased emphasis on product testing and installation safety should be considered as beneficial to the industry. They are unlikely to be a constraint on future demand because, it can be argued, the net effect will be to increase the level of consumer acceptance of SFBA's. Nevertheless, manufacturers who do not have their units certified run the risk of finding their market limited to unwary customers and customers not applying for COSP grants. Given the growing consumer preference for certified units, most people in the trade feel that certification eventually will become the norm.

8.2 Air Pollution Problems and Health Hazards

In Canada, no areas have been identified where air pollution from residential woodburning appliances has presented a problem. Consequently, there has been no need for pollution control authorities to restrict residential woodburning. Taking into account the current level of SFBA use in B.C., and growth over the foreseeable future, it appears unlikely that pollution problems will occur. The most immediate areas for potential concern would be densely populated urban communities but there is no evidence to suggest that these areas are, or may become, extensive users of fuelwood sufficient to cause a measureable problem.

While this is valid as far as B.C. is concerned, there are other areas in North America where problems do occur. Since 1973, coincident with the rapid increase in the use of wood for home heating in some areas of the United States, the contribution from that source to the total air burden of pollutants has increased. It is reported to have reached the point where some communities, especially in closely settled neighbourhoods in inversion-prone valleys, have considered imposing restrictions on the use of wood stoves and fireplaces.

The major pollutants from residential wood fired appliances are particulates, organics, and carbon monoxide. Nitrogen oxides are also emitted. The pollutants of primary concern, at present, are polycyclic organic materials (POM) which are thought to be potentially carcinogenic.

The magnitude of the air pollution problems, said to be associated with SFBA's in some areas of the U.S., can be ascertained from the findings of the following studies:

- A recent study for the U.S. Environmental Protection Agency (EPA) indicated that wood combustion is the largest stationary source of POM. This study also found that wood stoves operated at high elevations resulted in significantly higher pollutant emissions(1).

- A Tennessee Valley Authority (TVA) study (2) indicated that extensive use of wood burning heaters in densely populated areas could contribute to violation of the U.S. National Ambient Air Quality Standards. However, this study also indicated that conversion of up to 25 per cent (or 1 in 4) of the TVA's total households, to residential wood burning equipment, would not result in any significant impact on the overall regional air quality.

- A study by Monsanto Research (3) estimated that residential wood stoves contribute 80 per cent of the total burden of POM originating from stationary sources.

- In Waterbury, Vermont, it has been estimated that, in the residential areas, wood smoke emissions could account for up to 35 per cent of the total suspended particulates. The study also indicated that the concentration of wood smoke is affected by the number or density of residential wood burners, and meteorological conditions (4)

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(1) J.A. Peters, T.W. Hughes, and D.G. DeAngelis, Wood Combustion at Elevated Altitudes. (1980)

(2) D. Karen Knight, Wood Heat Emission Workshop February 27, 1980.

(3) D.G. DeAngelis, D.S. Ruffin, J.A. Peters, R.B. Reznik, Source Assessment: Residential Combustion of Wood EPA-600/2-80-0426

(4) Cedric R. Sanborn et al. Preliminary Analysis of the Ambient Impacts of Residential Woodburning in Waterbury, Vermont.

At this time, the U.S. EPA apparently is not considering any regulatory action regarding the use of wood as a residential fuel. In Canada, where primary responsibility for air pollution regulation lies with the provinces, no regulatory action is contemplated either. The U.S. EPA is considering a public awareness/education program, the object of which would be to inform the public of the proper way to burn wood and thus reduce air pollution. Other institutional and regulatory approaches considered applicable by some pollution control agencies include:

- testing and certification programs under governmental or trade association sponsorship
- "weatherization programs" to reduce heating needs
- educational programs
- governmental efficiency/emissions/safety inspection programs (e.g. similar to those in West Germany) and
- government or trade association research programs to develop improved emission control techniques.

The longer term implications for product design in the SFBA manufacturing industry are clear. There is a need to develop SFBA's which are less polluting than existing generations of appliances. Pollution can be controlled to some extent by not starving airtights of air supply at early stages of the burn and by burning properly seasoned wood.

8.3 Fuelwood Availability and Comparative Costs

The extent of use and demand for fuelwood is dependent largely on comparative prices of other fuels. Fuelwood for aesthetic uses of fireplaces is an exception in having a low sensitivity to price. Comparative heating values of wood versus fuel oil, natural gas and electricity prevailing in the Lower Mainland as of September, 1981 are shown in Table 7. The table may be up-dated by adjusting the comparative costs using unit costs prevailing at any particular time (ie by multiplying equivalent or comparative quantitites by respective unit costs).

In most parts of rural B.C., the availability of fuelwood (see Appendix F) is unlikely to pose any major constraint to the growth of SFBA demand. In some urban areas, however, diminishing fuelwood supplies and rising fuelwood costs are likely to cause some constraint to SFBA demand. It is possible also, judging from comments in trade journals, that fuelwood availability will constrain future SFBA demand in other regions of Canada. This does not necessarily imply that demand for SFBA's as a whole would fall below potential, as other solid fuels can be utilized and different types of SFBA's can be introduced on the market.

From the distribution standpoint, however, the potential for a significant increase in fuelwood use in B.C. is constrained at present because there are few if any, sizeable networks or organizations for harvesting, collecting and distributing the product to residential users. Recently, boxed fuelwood, containing red alder, selling for about $4 per box (1), has been distributed through garages and other outlets in areas such as the Lower Mainland. This type of activity is expected to continue. The use of SFBA's in urban areas would clearly receive a stimulus from the existence of a reliable and convenient distribution network through which buyers could obtain supplies of fuelwood of consistent quality at reasonably stable prices.

Recent prices for fuelwood have risen to around $125 per cord of unseasoned wood (September 1981). Over the medium to longer term, further price increases can be expected, particularly as competition rises for economically accessible supplies.

At present, stoves sold in B.C., designed and certified for fuelwood use, are not certified or suitable for coal, synthetic fuel-logs or wood pellets. There are, however, appliances on the market, such as the 'Godin' models made in France, that can burn fuelwood, wood pellets, synthetic fuel logs and coal. This stove is thought to be a good example of an appliance which would meet secondary heating requirements, particularly for urban residences, and provide the utility and amenities of wood burning as outlined earlier. As the SFBA market in B.C. matures, this type of appliance may become a viable item for manufacturers to produce in B.C.

For a further discussion of the availability of fuelwood supply in B.C. see Appendix F.

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(1) weighing about 9.1 kgs. (20 lbs.) and containing the equivalent of 135,000 BTU's of energy.

Table 7

Comparative Heating Values and Costs of Wood Versus Fuel Oil, Natural Gas and Electricity for Lower Mainland

Equivalent Quantities and Costs

Fuelwoods	Available Heat Btu per Cord (Cost$)	No.2 Fuel Oil Imp. Gallons (Cost $)	Natural Gas Therms (Cost $)	Electricity kWh (Cost $)
Group 1				
White Birch Douglas Fir Red Maple Tamarack	19 Million Btu (155)	161.6 (195)	238 (74.4)	5569 (214)
Group 2				
Alder Cedar Hemlock	14 million Btu (135)	119 (144)	175 (54.7)	4103 (158)

Notes

1. Fuel oil, natural gas and electricity unit costs are those current in Vancouver, B.C. in September, 1981 and are as follows:

No. 2 Fuel Oil	$1,205/Imp. gal ($1.004/US gal)
Natural gas	$0.3124/therm
Electricity	$0.04589/kWh for first 550 kWh $0.03089/kWh in excess of 550kWh Assume average cost of $0.03839/kWh.

2. Wood prices are those proposed by a new entrant into the fuel wood supply market and are for seasoned wood.

3.a) Fuelwood is seasoned at 20 per cent moisture content and burned at 60 per cent overall efficiency.

b) Fuel oil is burned at 70 per cent overall efficiency, 111,600 Btu per gallon.

c) Natural gas is burned at 80 per cent overall efficiency, 80,000 Btu per therm.

d) Electric heat utilized at 100 per cent efficiency 293 kilowatt hours = 1 million Btu.

Source: Consultants' estimates.

9.0 STRATEGY IMPLICATIONS

The purpose of this section is to identify and discuss the principal implications of the study's findings, in terms of future development strategies, for B.C. manufacturers of SFBA's.

9.1 Excess Capacity is Likely to Lead to Rationalization in the Industry

Section 5.0 indicated that the B.C. industry has potential capacity to produce in the range of 45,000 to 55,000 SFBA's per year. This level of capacity developed as a result of very buoyant market conditions which peaked in the 1979 market period.

Demand for SFBA's in B.C. reached a high point, in 1979, of an estimated 39,000 units. Of this, over 90 per cent were supplied by B.C. manufacturers many of whom only recently entered the industry. In contrast, in the mid-1970's, very limited SFBA manufacturing capacity existed in B.C. and much of the demand was met by units imported from other areas.

However, SFBA demand in B.C. declined by about 18 per cent in 1980 to an estimated 31,900 units. A preliminary assessment suggests that a further decline in demand was experienced in 1981, to an estimated 25,000 units (1). Some of this decline can be attributed to reduced economic activity in the province with consequent lower levels of housing starts.

There is also evidence of market saturation, in the sense that SFBAs have already been supplied to many of those who would be considered the most likely users. Correspondingly, there are indications that potential purchasers prefer SFBA's which are of comparatively high efficiency and which have aesthetic features such as a view of the fire.

In Section 6.0, it was projected that, over the five year period 1982-86, demand for SFBA's in B.C. will average 29,700 units per year. Thus, the current over-capacity of the industry is expected to persist. There may be exceptions to this for certain types of SFBA's, but the overall outlook suggests that conditions within the industry will be very competitive for at least the next two to three years.

Consequently, it is also expected that some manufacturers will not be able to regain the market-share they had during the earlier more buoyant markets. A progressive rationalization in the industry is likely, resulting in a decline in the number of firms in the industry with a possible increase in market-share for those remaining in business.

In this respect, the B.C. industry is in a similar position to manufacturers in many other parts of North America. Compared with other areas, however, the current recession in the B.C. industry has occurred later because of the comparative buoyancy of the B.C. economy. Excess manufacturing capacity in some of these other areas is believed to be considerably higher than in B.C. and bankruptcies have been reported.

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(1) see Table 6, page 43.

9.2 Efficiency and Aesthetics are Becoming Increasingly Important

Analysis of the B.C. Market for SFBA's shows that two specific criteria are becoming increasingly important to purchasers of SFBA's. These are the efficiency of the unit and its aesthetics. Efficiency is the strongest purchasing criterion where an SFBA is to be used for primary heating purposes. For similar SFBA's the price of the units also becomes important. Efficiency is an important consideration too in secondary heating applications, but a growing number of purchasers also require a unit which has high visual appeal. Unfortunately, SFBA's, as a rule, are not rated for efficiency so the purchaser is left to judge for himself which SFBA is more, or less, efficient than another. Some well established manufacturers do provide efficiency ratings, based on their own tests, but this is of little use if a competing unit is not rated, or rated by tests under different or unknown conditions.

It was pointed out earlier, in Section 6.0, that the appearance of a unit always was important to the consumer, even before the advent of airtights. However, in the absence of attractive airtights being available, the typical North American consumer was prepared to accept an SFBA which, if not attractive, at least was efficient. The development, and increased availability, of attractive airtight units in the late 1970's, together with increased consumer awareness of what is available, has led to a decline in demand in B.C. for, what one dealer has described as, "the unadorned, inefficient black box" type of stove.

In secondary heating applications, where much of the future demand for SFBA's is expected to develop, the typical purchaser usually looks for a unit which will enhance his living environment and which is more efficient than a masonry fireplace. The growing proportion of SFBA's which have glass doors attests to this trend. Although the scope for improvements in the "state-of-the-art" are limited, there are some possibilities. Norway's Jotul introduced their new model 201 in 1981 designed for "the professional wood burner" This stove is small, has two chambers in a vertical configuration, and aims to achieve higher combustion efficiency without the use of catalysts.

9.3 Safety, Product Certification and Fuels Gain Importance

The growing awareness among consumers of possible safety hazards, the need for regular flue cleaning, maintenance of the SFBA and the availability of fuelwood supply, are additional factors to be taken into account. This is true whether the unit is intended for either primary and/or secondary heating. It is important also for manufacturers and dealers to be able to demonstrate to consumers that their SFBA's meet, or exceed, accepted standards of design by having their products certified.

Efficiency and price are key considerations in cases where primary heating is the objective, as noted earlier. In addition, other factors determining the selection of a boiler or furnace include the ease of starting the burn, the regularity with which the units must be re-fueled, ash disposal and so on. Another factor, currently of limited impact as yet in B.C., is the ability of the SFBA to utilize solid fuels other than fuelwood.

9.4 Manufacturers Should Develop Forward Integration Links

The more successful manufacturers and distributors in B.C. have developed strong retail links. The development of specialty dealers in SFBA's has facilitated this trend. These dealers, by virtue of their specialization, are able to offer professional advice to potential buyers with regard to the type of SFBA most suitable for his needs. They can also provide guidance for installation and maintenance. Typically, a favourable rapport is developed with customers. After-sales service, in terms of follow-up advice, frequently has the effect of developing further sales through enhancing the dealer's reputation through word-of-mouth.

Even if dealerships are not specialists in SFBA's, a strong link between them and manufacturers and/or distributors can have a positive effect on long term sales development. Consistency and reliability of supply is only one factor in this context. The alert dealer can be a very useful source of "feed-back" information to the manufacturer with regard to any design, installation, or usage problems which might occur with his products.

While SFBA specialty-stores are advantageous to consumers, they may be disadvantagous to the store itself, and potentially to the manufacturer. In particular, the cyclical nature of the market due to the seasonality of sales results in this type of dealer's business volume fluctuating fairly widely. Consequently, many specialty dealers find it necessary to diversify their operations by carrying other consumer home-improvement and do-it-yourself items. Manufacturers should see if they can diversify their operations to supply such items.

9.5 Export Potential Appears to be Limited Over the Next Few Years

It is estimated that in 1979 and 1980, about 20 per cent of SFBA's manufactured in B.C. were exported from the province. Section 7.0 noted that the principal export markets included Alaska, Alberta, Washington, and the mountain states. The comparative buoyancy of exports, until recently, has been attributed in part to the fairly rapid growth in SFBA demand in these areas, combined with favourable export conditions. In addition, B.C. manufacturers are located comparatively close to these areas and enjoy competitive transportation costs.

U.S. and Canadian tariff levels favour Canadian exporters and discourage imports of SFBA's. Together with the fairly substantial exchange rate differential between the U.S. and Canadian dollars, this has given Canadian exporters a substantial competitive advantage. Despite this, few manufacturers or distributors in Canada foresee any significant increases in the level of U.S. export sales in the immediate future.

The outlook for export demand for SFBA's produced in B.C. is clouded by severe overcapacity in the manufacturing industry throughout North America. Price competition has become very pronounced and supply is expected to continue to exceed potential demand in 1982 and probably into 1983. Many manufacturers report that they have very high inventories of unsold units and some have gone into bankruptcy.

Despite this oversupply situation, it appears that there may be selective export opportunities for B.C. manufacturers who can supply SFBA's which meet market needs in two important respects. Firstly, where units can be supplied at a price competitive with local suppliers or supplies from other areas. Secondly, where the units have a unique design or other selling features. An important pre-condition to successful export marketing, as for the domestic market, is the development of a strong and reliable distribution system, preferably integrated forward through a broad geographical spread of retail outlets.

9.6 Strategy Options for B.C. Manufacturers

The analysis presented in this report suggests that B.C. manufacturers of SFBA's should review their future business development efforts as follows:

1. Market Identification

While many existing manufacturers have successfully identified their desired markets, others have not. Market identification, in this respect, involves reviewing existing and past sales patterns. If necessary, this should be traced through any existing distributorship and dealership links. The objective would be to find out which markets are being served, in terms of types of SFBA's sold and by market segment on a geographical basis.

Identification of these markets may lead to a re-consideration of sales strategy and, over the longer term, may identify demand segments not currently being served or, alternatively, markets which should be avoided because of chronic oversupply.

2. Forward Integration

In the case of manufacturers who do not already have strong distribution links, it is recommended that this should be a priority. Depending on the scale of their manufacturing plant and their location producers should develop a distribution network which is oriented towards directing sales of their units to specific market segments: eg the builder market or the do-it-yourself market.

3. Market Expansion

Even where SFBA sales are the responsibility of distributors and/or dealers, manufacturers should pay careful attention to planned expansion of their existing and potential markets. They should encourage active sales by distributors and dealers, oriented to the three principal market segments identified in this report: namely,

Existing Households Likely to Purchase an SFBA

Households with an existing masonry fireplace will be the ones most likely to consider purchase of an SFBA. Inserts and airtight stoves are expected to be the items in most popular demand in this respect. A proportion of existing households will probably consider replacing an existing SFBA. Others probably will consider the purchase of an efficient solid fuel furnace or boiler for primary heating purposes. It is projected that, within the next five years, a total of 87,500 existing households in B.C. will consider purchasing an SFBA (see Section 6.6).

Consequently, sales and promotional efforts should be directed to the specific needs of these householders, notably by addressing possible demand constraints (eg fear of safety risks in the use of existing masonry flues). Dealers should be encouraged to discuss these types of constraints and advise the potential purchaser of any possible need to up-grade existing masonry chimneys or use approved metal chimneys, the economics of doing so, and assisting in and assuring safe installation.

The New Housing Market

A number of SFBA manufacturers and suppliers in B.C. have been successful in developing close links with house builders. Consequently, they have achieved a fairly high degree of sales penetration into this market segment. Manufacturers and distributors of heat forms and zero clearance fireplaces are notable in this regard. However, penetration of this market has been confined to local sales efforts. There appears to be scope for expanding sales. This potential is underscored by the existence of a fairly large number of individual house builders in the province who may be unaware of these products.

Market development may be achieved through direct discussions with builders, masonry fireplace sub-contractors, plumbing and heating contractors, and other specialty trades. In larger sub-divisions, discussions with developers may identify opportunities by installation of SFBA's in "show-houses" and so on. As noted earlier, there is an underlying trend towards incorporating an SFBA in luxury condominiums and in townhouses. Additional sales opportunities may exist in all of these market segments.

It is projected that, over the next five years, a total of 60,000 SFBA's will be required in the new housing market in B.C.

Commercial and Light Industrial Sales

This market comprises SFBA demand in tourist facilities such as ski-lodges, hotels, motels, restaurants and a wide variety of other commercial and light industrial applications for primary and secondary heating purposes.

The market size is difficult to quantify, but increased sales of heaters, furnaces and boilers are possible. Demand is projected to rise slowly over the next few years, and total about 1,000 units over the period 1982 to 1986.

Expansion of sales to this market will depend on the ability of the manufacturer and/or distributor to demonstrate a high standard of design efficiency and safety. Consequently, only certified units which meet building code approval and subsequent inspection standards are expected to be required. Sales and promotional efforts must be carried out largely on an individual basis.

4. Product Review and Development

Manufacturers should review how well their products meet the requirements of the marketplace. In particular, they should assess what can be done to improve their products in terms of design, safety features, and ease of installation, maintenance and operation.

It was noted earlier, in Section 5.0, that the trend toward certification of SFBA's has raised product standards and has increased initial capital requirements for entry into the industry. It is estimated (Appendix A, Table 1) that approximately 80 per cent of manufacturers already have certification for one or more of their models. It is apparent that, eventually, all SFBA's sold in Canada will need to be certified by an official certification agency.

Manufacturers and distributors should consider expansion of their product lines into such items as patio furniture, barbeques and other iron articles that would compliment their own operations and provide additional sale items for their dealers during seasonal periods of low SFBA sales.

New product ideas could also be developed. One example is the selective heating of areas of homes such as family rooms. The thermostat for the entire home may be set at say 60°F and the SFBA used for "heat topping" to say 70°F in one or two rooms. A second example is the use of SFBA to create a cozy and warm atmosphere in restaurants, real estate offices and similar businesses.

10.0 SUMMARY AND CONCLUSIONS

In September 1981, there were 29 manufacturers of SFBA's in B.C. The total number in Canada was around 200.

Manufacturers are located throughout Vancouver Island, the Lower Mainland, the southern Interior and, in the central and northern Interior regions.

Many of the manufacturers producing SFBA's in B.C. are relatively recent entrants into the industry. Some have fairly large franchised operations. Most others have developed their own designs.

The manufacturing industry in B.C., as elsewhere in North America, grew rapidly from the mid-1970's onwards, in response to a very high rate of growth in demand for SFBA's. In B.C., demand was met initially by increased imports. Franchised operations followed. Then numerous other smaller firms entered the industry.

It is estimated that manufacturing capacity in 1979 was around 36,000 units during which manufacturers produced near to capacity. Expectations of further growth in demand for SFBA's stimulated further capacity increases to 39,000 units in 1980 and to 43,000 units in 1981.

Although B.C. manufacturers were able to meet a high proportion of total SFBA demand there were imports of types or designs not produced in B.C. notably cast iron SFBA's. Exports to other areas, particularly to Alaska, Washington, the mountain states and the southern U.S. constituted about 20 per cent of total B.C. production.

It is estimated that B.C.'s consumption of SFBA's in 1979 totalled 39,000 units. Imports represented over 25 per cent, domestic production (net of exports) about 75 per cent.

Lower levels of economic growth in B.C. and other parts of Canada, plus a decline in housing starts together with satisfaction of the most opportunistic market demand, led to a decline in sales during 1980 to 31,900 units. This decline continued into 1981, with consumption estimated to be around 25,000 units.

B.C.'s demand for SFBA's in 1982 is projected to be around 25,100 units, with virtually no increase from the previous year. However, higher levels of economic growth in 1983 and beyond are projected to increase demand to a peak of around 34,700 units by 1984.

The average level of demand is expected to be 29,700 units per year over the period 1982-86. About 59 per cent of this is expected to be in SFBA's purchased for installation in existing homes. A further 40 per cent is likely to go into new housing. The balance, of about 1 per cent, is likely to be required in commercial/small industrial uses.

Although SFBA demand in B.C. is not expected to regain its peak 1979 level, future sales in B.C. in 1983 to 1985 are likely to be higher than in 1981 and 1982. Moreover, on a selective basis, there are likely to be export opportunities in neighbouring areas to B.C.

Overcapacity in the manufacturing industry is expected to persist in B.C., other parts of Canada and the U.S. Price competition, and reduced trade levels are anticipated during 1982 and probably into 1983.

A number of strategies are open to existing manufacturers seeking to improve their market share from present levels. These include better market research, forward integration (wider retail exposure), market expansion, product review and development and promotion of novel product uses.

APPENDIX A
TABLE 1

Summary of Survey Results: SFBA Manufacturers in B.C.
Plant Characteristics

Manufact-urer Code	Products Made	Max. Potential Units Per Season	Size	Manuf. Floor Area Sq. Ft.[1]	Max. No. Labour Empl'd	Product Cert.	Yrs. in SFBA Manuf.	Other Products or Services
M1	S,I	70	Sm	5,000		None	3	Machinery
M2	S,I	10,000	Lg	4,000		CSA	4	
M3	S,I	1,100	Lg	7,000	16	ULC	5	
M4	S,I	150	Sm	14,000	25	CSA	21	Stovepipe
M5	FSFP	2,000	Lg	6,000	20	ULC	1	Stovepipe
M6	S,I	500	Sm	3,000		ULC	1	
M7	S,I	700	Sm	2,500	6	ULC	4	
M8	S	350	Sm	2,000	2	None	5	Steel Fab.
M9	S,I, HWB	750	Sm	2,000	8	CSA		
M10	S	400	Sm		5	ULC	4	Steel Metal
M11	S,I	450	Sm	5,000	7	ULC	3	
M12	I	300	Sm	2,400	5	None	3	Ironwork
M13	S,I	300	Sm	3,000	3	CSA	2	Tool & Die
M14	S,I	600	Sm	4,000	12	None	2	Chimney Brushes
M15	S,I, PH	1,200	Lg	4,000	12	ULC	5	Pipe & Protectors
M16	S,I	500	Sm	400	5	ULC	5	Steel Fab.
M17	S	150	Sm	4,000	1	None	8	
M18	S	2,300	Lg	10,000	8	ULC	4	Aluminum Boats
M19	S,I, PH	300	Sm	2,800	6	ULC	5	Aluminum Boats
M20	S,I	750	Sm	3,800	6	ULC	3	Welding
M21	HF	2,700	Lg	9,000	6	CSA	8	
M22	S,I	4,500	Lg	23,000	30	CSA	3	Pokers
M23	S,I	(2,000)	Lg	4,000	10	ULC	1	None
M24	S	(100)	Sm	1,650	5	ULC	4 mos.	Stovepipe
M25	S,F	1,800	Lg		30	CSA	3	
M26	S,I	4,600	Lg	6,600	15	CSA	10	Machinery
M27	HWB	30	Sm		2	None	3	Machinery
M28	S,I	760	Sm			ULC		Steel Fab.
M29	S,I	(4,000)	Lg	5,000	12	ULC	6 mos.	Steel Fab.
Total		43,360						

S - Stove
I - Fireplace Insert
HWB - Hot Water Boiler
F - Furnace
PH - Pool Heater
FSFP - Free-Standing Fireplace
HF - Heat Form
( ) - denotes estimated production in 1981 for new plants, data gaps denote "not available"
* Does not necessarily apply to all products manufactured.

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[1] Variations in floor area/unit may indicate products other than SFBA's are manufactured.

APPENDIX A
TABLE 2

Summary of Survey Results: SFBA Manufacturers in B.C.
Financial Data Reported by Manufacturer

Manufacturer Code	Products Made	Equipment Cost $000	Labour Cost $/hr.	No. of Sales Staff	No. of Office Staff	No. of Shareholders	Labour hr./SFBAunit	Export to U.S.?
M1	S,1				3	2		No
M2	S,1	175						Yes
M3	S,1	50		1		3		No
M4	S,1	100	9.00		1			No
M5	SFSP	250			2	3		Yes
M6	S,1	55				1		Yes
M7	S,1	5	8.00			2		No
M8	S	6				2	8	No
M9	S,1, HWB	26			1	1	9	No
M10	S	30				1		No
M11	S,1	120			2	3		No
M12	1	35				2		No
M13	S,1	100	8.00	2	0	3		No
M14	S,1	60	8.00	0	0	2	4	No
M15	S,1, PH	100	10.00	2	0	3		No
M16	S,1		8.00 to 10.00	1	1	3		No
M17	S		17.00	1	1	3	9	No
M18	S,1	50	8.00 to 9.30	1	2	1		No
M19	S,1, PH	30	10.00	1	0	1		No
M20	S,1	30	8.00		0	1		No
M21	HF	150	9.00	1	1	4		Yes
M22	S,1	215	Pce.work	3	6	3		Yes
M23	S,1	30	10.00	1		1		Yes
M24	S		8.00		1	1		No
M25	SF	163				3		No
M26	S,1	200	10.50		1	2		No
M27	HWB		15.00	1				No
M28	S							No
M29	S,1			1				Yes

Note: For product legend, see Table I, Appendix A. Data omitted where not available.

APPENDIX A

TABLE 3

Sizes, Weights and Listed Retail Prices for a Typical Range of Fireplace Inserts and Stoves Manufactured in B.C.

Description	Size in Inches (h x w x l)	Weight (lbs)	Listed Retail Price $
Stove	26 x 16 x 26	273	436.
Stove	32 x 18 x 36	402	489
Stove	32 x 21 x 41	495	569.
Stove-Fireplace	32 x 25 x 29	454	695.
Stove-Fireplace	32 x 29 x 32	558	745.
Fireplace	22 x 25 x 37	500	895.
Stove (for mobile home)	35 x 24 x 27	432	895

Source: trade discussions

APPENDIX A

TABLE 4

BRITISH COLUMBIA: Estimates of Principal Types of Heating Fuel (May 1980)

Fuel Type	Number of Households (thousands)	Per Cent of Total
Oil or Other Liquid Fuel	227	25
Piped Gas	489	55
Bottled Gas	7	1
Electricity	145	16
Coal or Coke	-	-
Wood	27	3
Other	1	-1/
Total	896 2/	100

1/ less than one per cent
2/ Statistics Canada estimate of number of households

Source: Statistics Canada Catalogue 64-202 (1980)

APPENDIX A

TABLE 5

BRITISH COLUMBIA: Estimates of Principal Types of Heating Equipment (May 1980)

Heating Equipment Type		Number of Households (thousands)		Per Cent of Total
Steam or Hot Water Furnace		189		21
Hot Air Furnaces				
Forced	517		58	
Other	21		2	
Total		538		60
Heating Stoves		29		3
Electricity		135		15
Cook Stoves or Ranges		-		-
Other		6		1
Total, B.C.		896		100

Source: Statistics Canada Catalogue 64-202 (1980)

APPENDIX A

TABLE 6

BRITISH COLUMBIA: Estimates of Type of Fuel for Cooking Equipment (May 1980)

Fuel Type	Number of Households (thousands)	Per Cent of Total[1]
Oil or Other Liquid Fuel	7	1
Piped Gas	62	7
Bottled Gas	13	2
Electricity	811	90
Coal or Coke	-	-
Wood	-	-
Other	3	-[2]
Total	896	100

[1] data are rounded

[2] less than one per cent

Source: Statistics Canada Catalogue 64-202 (1980)

APPENDIX A

TABLE 7

BRITISH COLUMBIA: Homes with Fireplaces (1979)

	Number	Per Cent Of Total
With Fireplaces	386,000	45
Without Fireplaces	471,000	55
Total	857,000	100

BRITISH COLUMBIA: Homes with Supplementary Heating Equipment (1979)

	Number	Per Cent of Total
Heating Stoves	32,000	19
Cookstoves/Ranges	8,000	5
Portable Heaters	112,000	67
Other	15,000	9
Total	167,000	100

BRITISH COLUMBIA: Fuels for Supplementary Heating Equipment (1979)

	Number	Per Cent of Total
Oil and Other Liquid Fuels	8,000	5
Gas and Electricity	119,000	71
Wood, Coal, Coke	39,000	23
Other	1,000	1
Total	167,000	100

Source: Statistics Canada Catalogue 64-202 (1979)

APPENDIX A

TABLE 8

CANADA: Principal Heating Equipment in Households by Type of Fuel[1] (May 1980)

(all dwelling types)
(thousands)

	Steam or Hot Water Boiler	Hot Air Furnaces		Heating Stoves	Electricity	Other	Cook Stoves Or Ranges Total[1]
		Force	Other				
Oil and Other Liquid Fuel	915	1,695	90	196		18	2,914
Piped Gas	729	2,193	86	61		9	3,078
Bottled Gas	-	38	4	8		2	52
Electricity	-	54	-		1,462	6	1,522
Coal or Coke	-	4	-	10		7	21
Wood	4	48	26	105		35	218
Other	5	-	3	6	-	8	21
Total	1,653	4,032	209	386	1,462	84	7,826[2]

[1] Statistics Canada notes that there is a fairly large potential percentage error in many of these estimates.

[2] Statistics Canada shows total as 7,807,000 households, total shown above is arithmetical summation,

Source: Statistics Canada 64-202 Annual (May 1980) Table 10

APPENDIX A

TABLE 9

DWELLING STARTS IN B.C., BY TYPE 1971 - 1981

	1971	72	73	74	75	76	77	78	79	80	81p
Conventional Housing/1											
Single Detached	17,707	18,890	21,313	18,254	18,616	20,247	15,501	18,195	17,792	22,600	19,193
Semi-Detached and Duplex	1,220	818	901	1,050	1,565	1,723	1,535	1,374	780	989	1,245
Row	1,803	2,362	1,501	1,740	3,300	3,263	3,124	2,687	1,993	2,243	4,741
Apartments and other	14,035	13,247	13,912	10,376	10,671	12,494	12,198	6,362	6,780	11,714	16,406
Total Conventional Housing	34,765	35,317	37,627	31,420	34,152	37,727	32,358	28,618	27,345	37,546	41,585
Mobile Homes/2	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	1,803	2,593	3,748
Percentage											
Single Detached	51	53	57	58	54	53	48	64	65	60	46
Semi-Detached and Duplex	4	2	2	3	5	5	5	5	3	3	3
Row	5	7	4	6	10	9	10	9	7	6	11
Apartments and Other	40	38	37	33	31	33	37	22	25	31	40
Total Conventional Housing	100	100	100	100	100	100	100	100	100	100	100

1/ Conventional Housing refers to all new residential construction excluding mobile homes.

2/ Mobile Home shipments from B.C. Manufacturers

Sources: CMHC and Manufactured Housing Association of B.C.

N/a - Not available

P - Provisional

APPENDIX A

TABLE 10

DWELLING STARTS IN URBAN AREAS IN B.C.

	1971	72	73	74	75	76	77	78	79	80	81
Single Detached	7,203	13,224	15,127	12,595	12,758	14,361	11,080	11,523	13,420	16,580	11,409
Semi-Detached Duplex	546	684	768	932	1,391	1,373	1,333	1,253	637	854	877
Row	1,263	2,007	1,228	1,412	2,874	2,957	2,904	1,972	1,691	2,179	3,651
Apartments	11,736	11,917	11,567	8,676	9,546	10,884	10,985	4,828	5,518	10,724	14,055
Total	20,748	27,832	28,690	23,615	26,569	29,575	26,302	19,576	21,086	30,377	29,992
Percentage											
Single Detached and Duplex	35	47	53	53	48	49	42	59	63	55	38
Semi-Detached Duplex	3	3	3	4	5	5	5	6	3	3	3
Row	6	7	4	6	11	10	11	10	8	7	12
Apartment	56	43	40	37	36	36	42	25	26	35	47
Total	100	100	100	100	100	100	100	100	100	100	100

Note: Single family = single detached, semi-detached and duplex

Source: CMHC

APPENDIX B

LIST OF PERSONS/ORGANIZATIONS CONTACTED

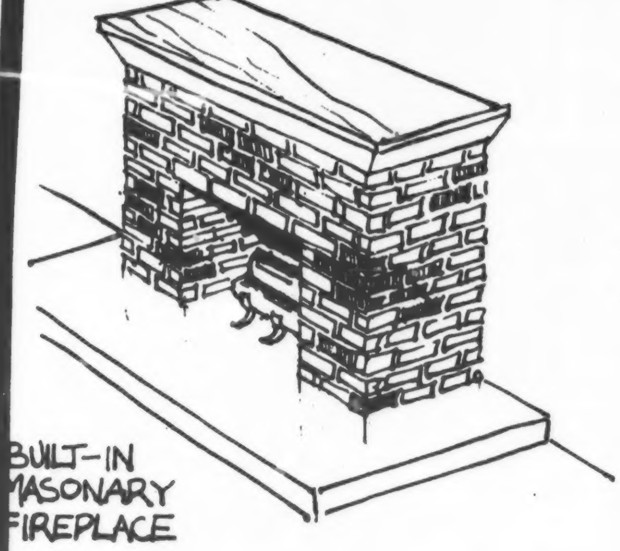
A. Manufacturers

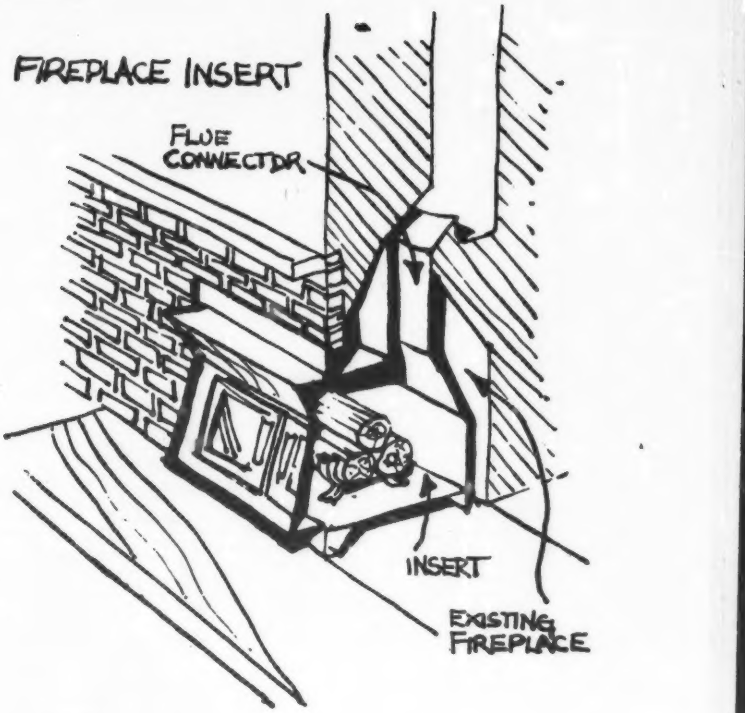
Rosedale Machine Shop	Rosedale
Estrin Manufacturing Ltd.	Vancouver
EBCO Business Industries Inc.	Burnaby
Schrader Wood Stoves	Burnaby
Blaze-Euroclean	Port Moody
Spincraft Manufacturing Corp.	New Westminster
Triumph Woodstove	Richmond
Mid Island Stove Works	Parksville
Lemon Fabricators Ltd.	Port Alberni
Pacific Energy(of E.P. Industries Ltd.)	Duncan
Playsted Sheet Metal Ltd.	Victoria
Osburn Industries	Victoria
Ironcraft Products Ltd.	Victoria
Wilk Stove Ltd.	Sidney
RSF Energy Ltd.	Smithers
Kodiak Manufacturing Ltd.	Cranbrook, B.C.
HGD Canada Inc.	North Vancouver
Gott Enterprises Ltd.	North Vancouver
Donahue Industries Ltd.	Kamloops
Black Pine Manufacturing Ltd.	Kamloops
Northside Steel Fabricators Ltd.	Kelowna
Calvert Fireplaces and Furnaces	Vernon
Harber Mfg. (B.C.) Limited	Vernon
Dainard Enterprises Ltd.	Kelowna
Aardvark Welding & Fabrication Ltd.	Westbank
Northern Fireplaces Ltd.	Summerland
E.S.C. Manufacturing Corp.	Penticton
Lloyd Controls Ltd.	Port Coquitlam
Emberline Industries Ltd.	Port Coquitlam

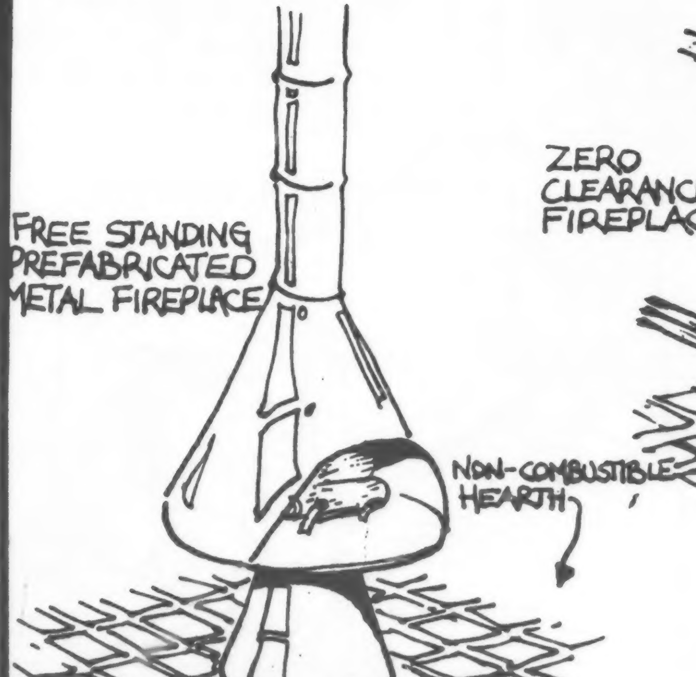
B. Dealers and Distributors

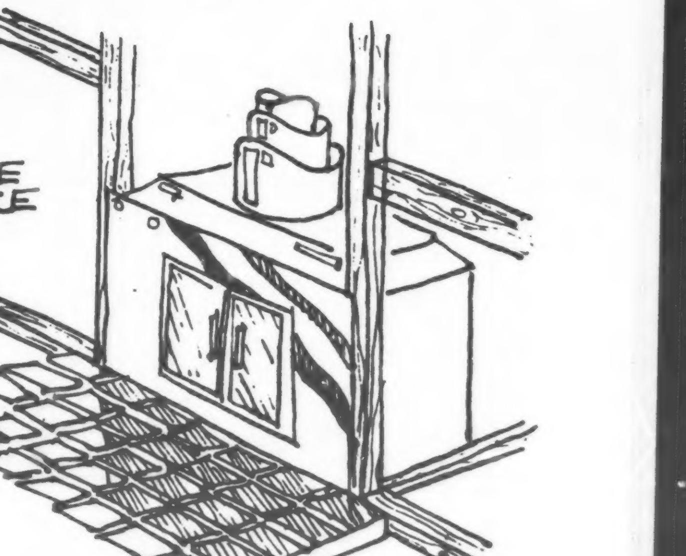
Solace Energy Centre	Vancouver
Fisher Stove Works	North Vancouver
Miles Industries Ltd.	North Vancouver
Fireside Distributors	Vancouver
Fireplaces Unlimited	Burnaby
The Snugg Woodstove Shoppe	Port Moody
Arctic Distributors	Surrey
Ecco Energy House	Langley
Delco Fireplaces	Langley
Fresh Air Fireplaces	Coquitlam
Woodstoves Unlimited	Courtenay
Irly Bird	Courtenay
Pates Supply	Nanaimo
Duncan Hearth & Home	Duncan
Country Wood Stoves Ltd.	Victoria
Vancouver Island Stove Shop	Victoria
Vaglio Fireplace Ltd.	Vancouver

FIREPLACES


BUILT-IN
MASONARY
FIREPLACE


FIREPLACE INSERT
FLUE CONNECTOR
INSERT
EXISTING FIREPLACE

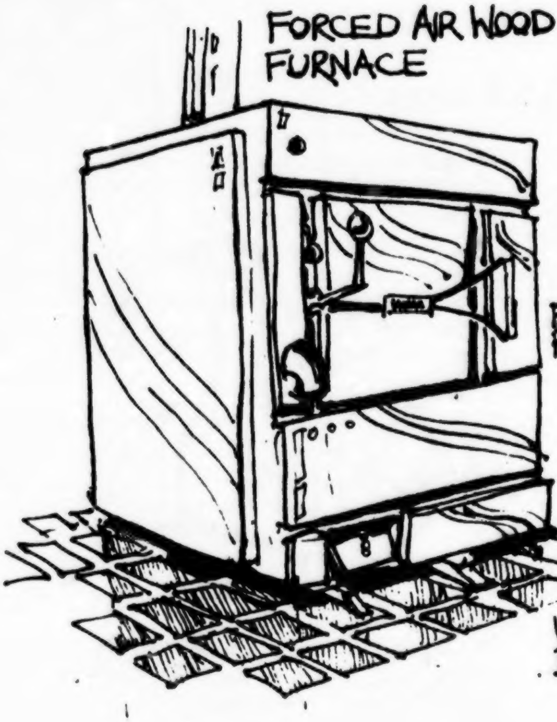

FREE STANDING
PREFABRICATED
METAL FIREPLACE
NON-COMBUSTIBLE HEARTH

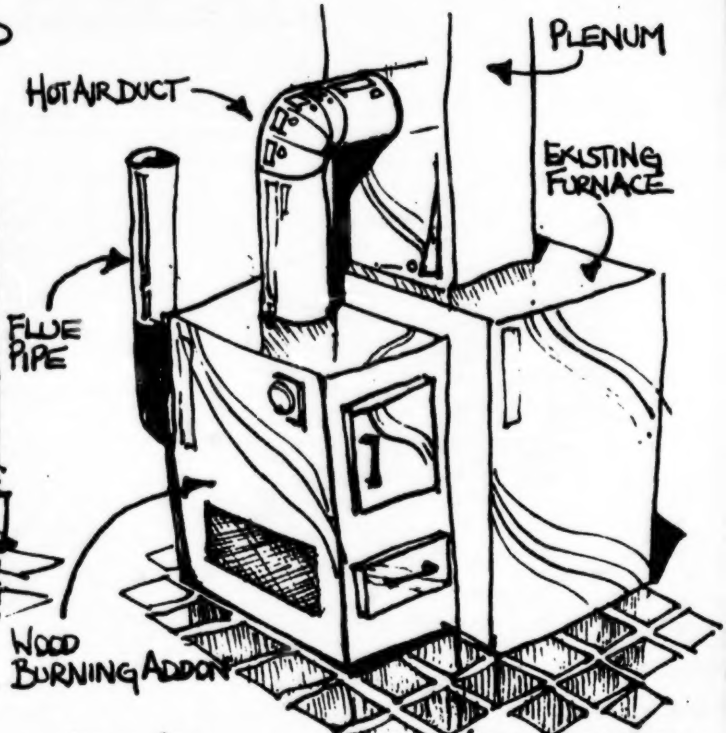

ZERO
CLEARANCE
FIREPLACE

APPENDIX C

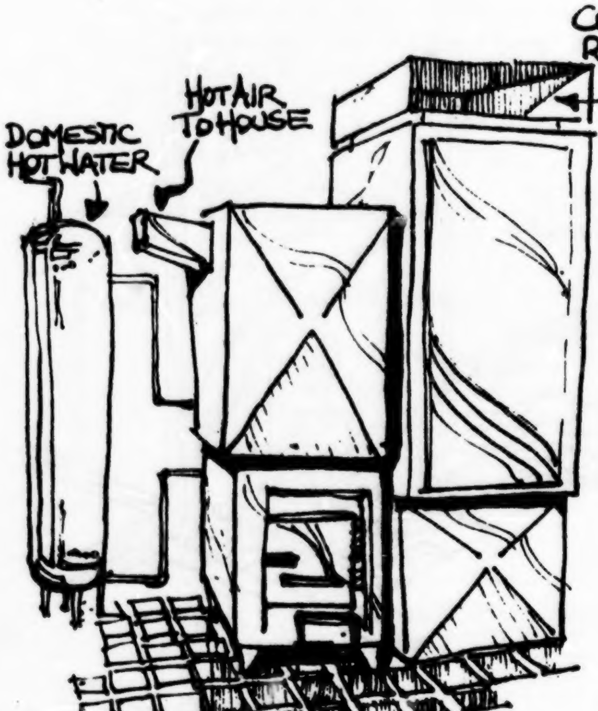
FURNACES AND BOILERS

FORCED AIR WOOD FURNACE

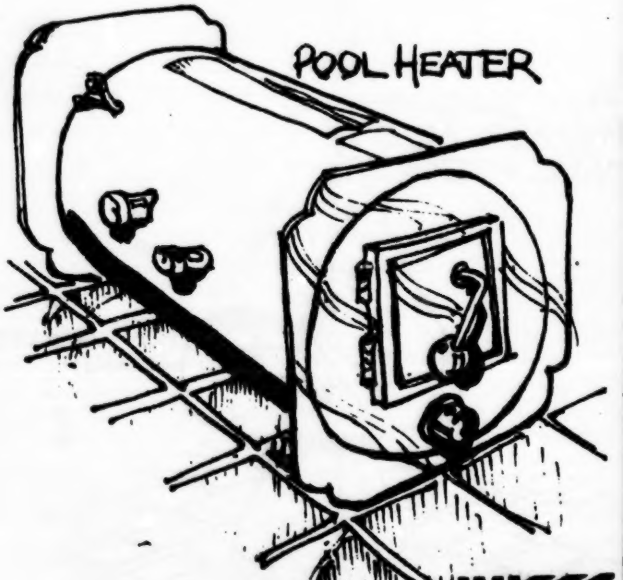



HOT AIR DUCT
PLENUM
EXISTING FURNACE
FLUE PIPE
WOOD BURNING ADDON

WOOD BURNING DEVICE "ADD-ON" TO EXISTING FURNACE


COLD AIR RETURN
HOT AIR TO HOUSE
DOMESTIC HOT WATER

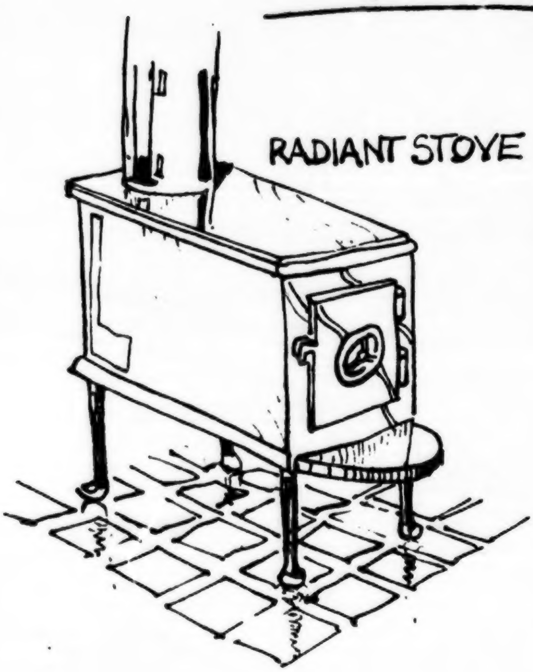
GRAVITY WOOD FIRED HOT AIR FURNACE WITH HOT WATER HEATER.

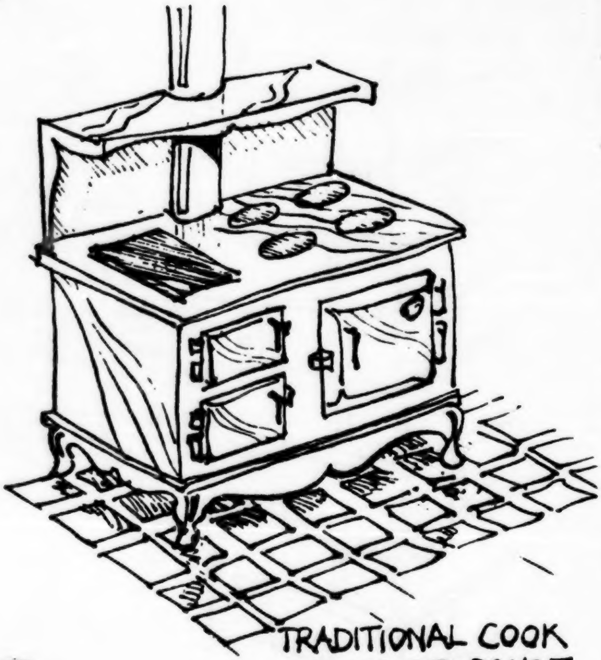


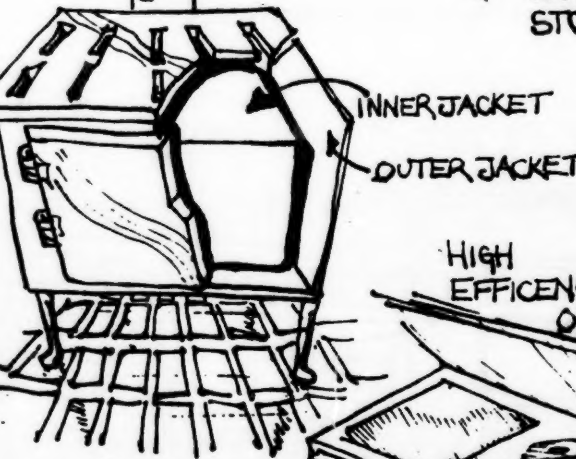
POOL HEATER

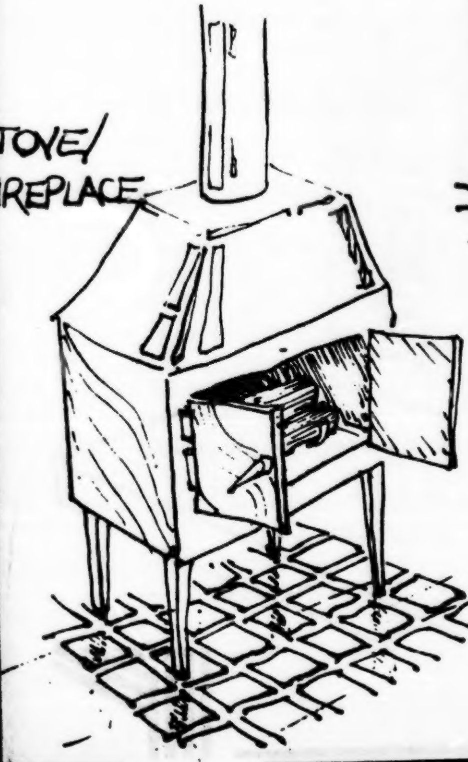
APPENDIX C

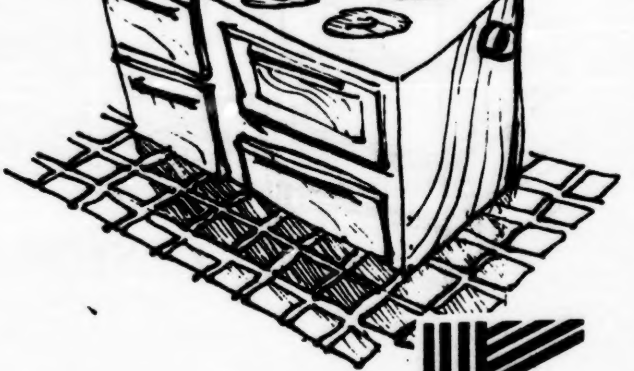
SPACE HEATERS/STOVES


RADIANT STOVE


TRADITIONAL COOK STOVE OR RANGE

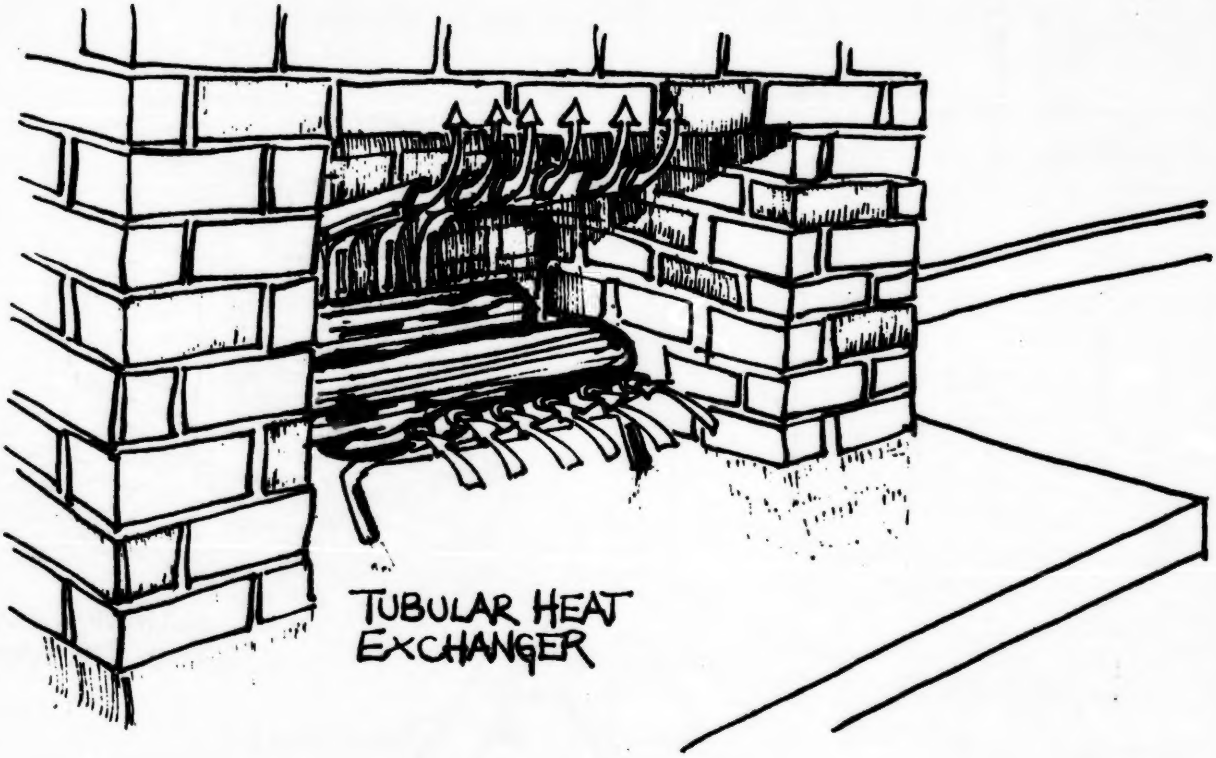

CIRCULATING HEATER
INNER JACKET
OUTER JACKET


TOVE/
IREPLACE

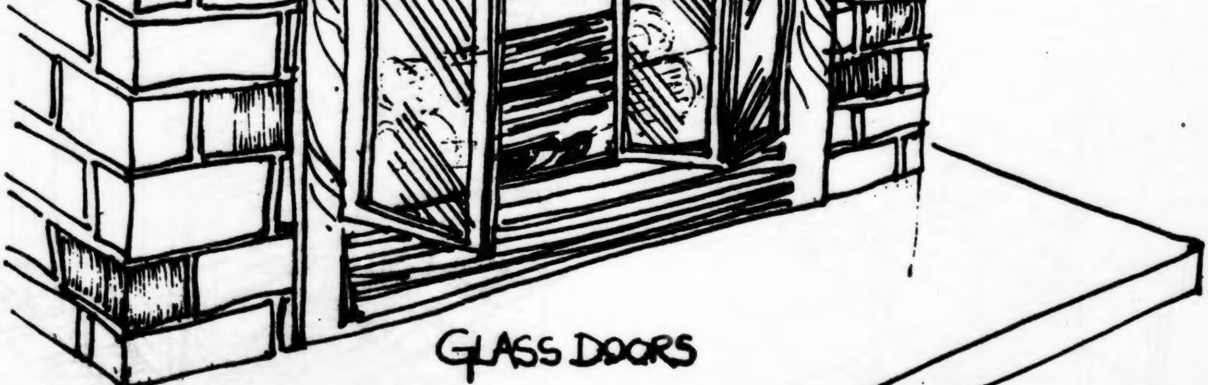

HIGH EFFICENCY (AIRTIGHT) TYPE OF COOK STOVE

APPENDIX C

FIREPLACE ACCESSORIES



TUBULAR HEAT EXCHANGER



GLASS DOORS

APPENDIX D

Canadian Substitution Program

(COSP)

ELIGIBILITY OF WOOD-BURNING SYSTEMS

The following criteria define the conditions under which wood stoves and furnaces are eligible for COSP grants.

Displacement of Oil

Properly installed and appropriately located wood-burning equipment with controlled combustion is capable of supplying most of the heating needs of an average Canadian home and therefore satisfies the requirement of COSP for displacement of at least one-half of the oil used for this function.

Safety

Wood-burning equipment must be certified to a relevant standard in order to qualify for a taxable grant covering 50 per cent of conversion costs up to a maximum of $800.

The relevant standards currently are CSA-B366 or ULC-S627 and are applied by the Canadian Standards Association, Underwriters Laboratories of Canada or Warnock Hersey Professional Services Ltd. In addition to the certification requirement, the wood-burning system must be installed safely and in accordance with regulations set by any local authority.

Following installation, systems may be inspected by, or on behalf of, EMR.

Types of Eligible Appliances

Space heaters, furnaces and boilers, and combination furnaces running on wood and oil are eligible, provided they meet the above-mentioned criteria. Similarly, hybrid systems running on wood and electricity are eligible wherever electricity is an eligible alternative.

Since costs of installation and equipment directly associated with the installation of wood-burning systems are eligible expenses under the grant program, the following equipment also qualifies:

- thermostats, controls and electric wiring associated with the installation of heating equipment;
- duct work associated with fitting a new furnace to existing ducting;

- piping associated with fitting a new boilers to existing piping;
- chimney liners, where required;
- class "A" or other chimney suitable for solid fuel, including masonry;
- flue pipe or other venting equipment;
- automatic stokers;
- heat shielding, i.e., non-combustible material to meet installation requirements; and
- storage for fuelwood.

Fireplaces, fireplace inserts and ducting to previously unheated areas will not qualify for grants under COSP. Add-on furnaces will not be eligible under the program until an appropriate Canadian standard is available.

If the equipment was installed and accepted by the owner on or after October 28, 1980, a grant will be paid when administrative arrangements for the program are completed. Wood stoves with no Canadian certification will be eligible for grants only if they were purchased between October 28, 1980 and May 25, 1981.

APPENDIX E

DEMOGRAPHIC AND HOUSING STOCK CHARACTERISTICS UNDERLYING SFBA DEMAND IN B.C.

B.C. Population

B.C., had an estimated population of around 2.7 million persons in 1981, of which 2.1 million were 15 and over years of age, and accounted for approximately 11 per cent of Canada's population. In recent years, the province has experienced higher rates of real economic growth than most other provinces. It has also experienced a considerable influx of in-migration from many other parts of Canada and immigration from other countries.

The B.C. economy traditionally has been based on the extensive natural resources of the province, including forestry, the extraction of minerals and fossil fuels, fishing and agriculture. There is, however, an important and growing service sector and a sizeable tourism trade. Secondary industry, in the form of forest products manufacturing and a variety of mineral processing and allied industries, has long been an important mainstay of provincial economic growth.

Buoyant export demand conditions for B.C. products have been a major stimulus to the comparatively high rates of real growth, helped, in recent years, by the low relative value of the Canadian dollar on foreign exchange markets. As a result, the province's economic base has continued to expand and significant growth is expected to be achieved in a broad range of manufacturing industries, including some high technology areas during the 1980's and 1990's.

B.C.'s population, based primarily on migration from other provinces and immigration from other countries, expanded by about 2 per cent per year on average throughout the 1970's. Three features characterize the distribution of population in British Columbia. These are the heavy concentration of population in the southern coastal lowlands; valley-oriented lines of settlement, with large clusters of population in the southern and central interior; and large areas of unpopulated land.

The estimated 1980 population of the market areas within B.C. referred to in this study is summarized below:

	Thousand	Per Cent
Vancouver Island-Coast	482	18
Lower Mainland	1,382	52
Southern Interior	471	18
Central and Northern B.C.	302	12
Total B.C.	2,637	100

Source: Central Statistics Bureau, M.I.S.B.D.

Note: percentages are rounded.

The largest market area is the Lower Mainland with an estimated population of 1,382,000 persons, accounting for 52 percent of the province's population. The next largest areas, Vancouver Island-Coast and the southern Interior, are remarkably similar in terms of population. Each has a population of around 470,000 to 480,000 persons and each accounts for about 18 per cent of B.C.'s population. The remaining market area, referred to in this study as central and northern B.C., covers an extensive land area. It has a population of over 300,000 persons representing about 12 per cent of the population of the province.

Number of Households

Based on the assumption of an average of about 2.75 persons per household, it is estimated that the total number of households in B.C. was around 960,000 in 1980, of which 52 per cent was located in the Lower Mainland. A total number of 990,000 probable households is estimated for 1981, indicating household growth of about 30,000 for the year.

Housing Stock in B.C.

In considering the potential demand for SFBA's in B.C., and in order to estimate sales by region, it is important to review the types and location of residential dwellings in the province. The most reliable recent data on the housing stock are provided in the 1976 Census data.

The 1976 Census indicated a total housing stock of 828,000. Building activity since the Census has added approximately a further 160,000 units of conventional housing. Adjustments have to be made for demolition, conversions, mobile home shipments in B.C. and expected 1981 conventional housing completions. Assuming a net gain of 40,000 units in this category, the total housing stock in B.C. in 1981, for the purposes of this study, is estimated provisionally at 1 million units.(1)

Based on the Census analysis, single family dwellings accounted for about 70 per cent, apartments for about 24 per cent and mobile homes/other movable dwellings used for permanent occupancy for around 6 per cent of the total housing stock. Owned units represented about 65 per cent and rentals 35 per cent of the total housing stock.

Housing Stock on Vancouver Island-Coast

Census data indicate that about 19 per cent of B.C.'s housing stock was in this area in 1976. Housing market activity since then has shown considerable growth in single family and townhouses in the area overall, and in apartment construction in the major population centres of the Capital Region and Nanaimo.

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(1) the Statistics Canada User Advisory Service in Vancouver advises that 1981 Census data relating to housing stock will probably be publicly available towards the Fall of 1982.

It is provisionally estimated that the 1981 housing stock in this market area is around 192,000 dwelling units in total. For the purposes of this study, the following breakdown in units by structural type is estimated.

Vancouver Island-Coast: Housing Stock by Type (1981)

	No. (000's)	Per Cent
Single Detached	124	64
Single Attached	11	6
Duplex	6	3
Apartment	40	21
Mobile Homes)		
Other Movable Dwellings)	11	6
Total	192	100

Source: Woodbridge, Reed Data Base

For the area as a whole, Census data indicate that about two thirds of all dwellings are owned and one third are rented. Most (87 per cent) single detached units are owned as are most (90 per cent) mobile homes. Close to 87 per cent of apartments are rentals, and there is a high proportion of rentals among single attached (71 per cent) and duplex units (60 per cent).

Housing Stock in the Lower Mainland Region

This market area contains the bulk of B.C.'s housing stock, or about 550,000 occupied dwelling units out of the total 1 million estimated for 1981.

Lower Mainland: Housing Stock by Type (1981)

	No. (000's)	Per Cent
Single Detached	318	58
Single Attached	28	5
Duplex	22	4
Apartment	171	31
Mobile Homes)		
Other Movable Dwellings)	11	2
Total	550	100

Source: Woodbridge, Reed Data Base

For the area as a whole, Census data indicate that 61 per cent of all dwellings are owned and 39 per cent are rented. Recent growth in rental housing and multi-family activity in the Vancouver area indicates that the rental component in these estimates for 1981 may be low. Most (89 per cent) of single detached units are owned, as are most (93 per cent) of mobile homes.

In the Lower Mainland area, close to 88 per cent of apartments are rentals, and there is a high proportion of rentals among single attached (60 per cent) and duplex units (62 per cent).

Housing Stock in the Southern Interior

As noted earlier, the southern Interior market area is very similar in population size and various housing characteristics to the Vancouver Island-Coast region. Census data indicate that the area contains about 17 per cent of B.C.'s housing area. Total dwellings in 1981 are estimated at around 170,000 units, of which 74 per cent are owned and 26 per cent are rented. As is the case in the Vancouver Island-Coast area, the southern Interior is a popular area for recreational homes and caters for a considerable volume of tourist activity.

An analysis of the housing stock by structural type is provided below:

Southern Interior: Housing Stock by Type (1981)

	No. (000's)	Per Cent
Single Detached	117	69
Single Attached	10	6
Duplex	5	3
Apartment	19	11
Mobile Homes) Other Movable Dwellings)	19	11
Total	170	100

Source: Woodbridge, Reed Data Base

There is a comparatively large component of single family dwellings in the area and a smaller proportion of apartments and rental housing units compared with B.C.'s major areas of population concentration in the Capital Region and in Vancouver. Nevertheless, housing activity in some of the major centres in the southern Interior, including Kamloops and Kelowna, recently has shown fairly significant growth in townhouse and apartment building.

Mobile homes also are popular in the area and, in 1980, over one third of mobile home shipments within B.C. were destined for locations within the southern Interior.

Housing Stock in Central and Northern B.C.

This market area for SFBA's is characterized by (a) its large geographical area, (b) clusters of population around major regional centres of industrial and manufacturing activity (e.g., Williams Lake, Prince George, Prince Rupert), and (c) numerous smaller market areas with comparatively low population densities. Nevertheless, in the context of the demand for SFBA's, it is a significant market area with potential for SFBA sales.

Total housing stock in the area is estimated to be around 95,000 units, or about 9 per cent of the total for B.C. Owned dwellings represent a comparatively high proportion (71 per cent) of the total, with single family dwellings accounting for about three-quarters of all housing. The proportion of apartments in the total is similar to that in the southern Interior. Mobile homes and other movable dwellings permanently occupied represent a higher proportion of total dwellings than other areas of B.C.

An analysis of the housing stock by structural type is provided below:

Central and Northern B.C.: Housing Stock by Type (1981)

	No. (000's)	Per Cent
Single Detached	62	65
Single Attached	8	3
Duplex	3	3
Apartment	9	10
Mobile Homes)	13	14
Other Movable Dwellings)		
Total	95	100

Source: Woodbridge, Reed Data Base

APPENDIX F

FUELWOOD SUPPLY IN B.C.

Overview

A wide range of fuels are either used or potentially available in B.C. for residential heating. These include natural gas, fuel oil, electricity, fuel-logs, densified wood pellets and coal. Of these, natural gas, electricity and fuel oil are used most frequently. To a lesser extent, fuelwood is used for residential heating. Potential exists for residential uses of coal: however, at the present time, coal has a low level of utilization in B.C. and other parts of Canada. Wood pellets so far apparently have not been directed at residential markets. Fuel-logs of the compressed wood type and wax type are relatively costly and are usually used only in fireplaces.

The purpose of this section is to examine the main supply issues underlying fuel availability for SFBA users in B.C.

Fuelwood

Fuelwood (i.e., round or split firewood) is the most important and widely used solid fuel in B.C. There are, however, no readily available figures to indicate the relative importance of fuelwood in the overall residential fuel "mix".

It is known, however, that in excess of one-half of fuelwood users in B.C. cut their own supplies. Although figures are not available for B.C. as a whole, recent surveys (1) (2) indicate that of the users interviewed, 62 per cent did their own cutting. Average annual consumption levels were 2.4 cords (for those with wood stoves); 2.1 cords (fireplace inserts) and 1.2 cords (fireplace only).

British Columbia is extensively forested, containing about 40 per cent of Canada's merchantable timber and is a major producer of forest products. Coniferous species (firs, spruce, pine, cedar and so on) account for about 97 per cent of the standing timber volume in B.C., together with a relatively small proportion of hardwoods such as alder, aspen, cottonwood and maple. (3)

In the B.C. coastal region, the major hardwood species include red alder (about 55 per cent of the total mature volume), black cottonwood (32 per cent), broadleaf maple (8 per cent), white birch (2 per cent) and a small volume of aspen and other species (about 3 per cent).

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(1) see "The Feasibility of a Home Heating Fuelwood Industry on Southern Vancouver Island", Sierra Club (1981)

(2) "Residential Wood Heating Survey", Puget Sound Power & Light Co. (July 1980)

(3) see Symposium Proceeding: Utilization of Western Canadian Hardwoods, Forintek Canada Corporation (May 1980) for discussion of mature inventory and commercial volumes.

The B.C. Interior hardwood resources, in comparison with the coastal area, are relatively extensive. It is estimated that, of the roughly 200 million cubic metres of mature hardwood species in the province, close to 85 per cent is located in the northern Interior, the majority of which is in the Prince George forest region. The main component is aspen, which makes up nearly 70 per cent of the hardwood volume, while cottonwood and birch account for the remainder.

To date, the commercial utilization of the hardwood species that has taken place has not been extensive. There are indications that this may be changing (1). In the past, the limited markets for hardwood manufactured products from B.C. have been a major factor. Access to the timber is another problem in the north, and technological developments for its utilization have been slow.

A number of factors have combined recently to increase the utilization options of the hardwood resources. Firstly, there is increased interest in commercial harvesting by the forest products industry for wood products manufacture, as well as the use of forest residues as an energy source. Secondly, close to urban areas, hardwoods are in relatively high demand as fuelwood.

In addition to these, the potential value of B.C.'s currently under-utilized hardwoods becomes increasingly significant as hardwood and softwood global reserves decline. As a result, species which formerly had little commercial value are being sought in those areas where harvesting has become more viable. This pattern of development is a characteristic of the market place and is part of the normal evolution of commercial harvesting.

The preferred species for fuelwood near the larger metropolitan areas of Vancouver and Victoria are alder, maple and birch. Competition is strong for fuelwood supplies to meet the demands of these areas. Douglas fir also is used where it is available and it also provides a good all round fuel. Pine burns well, but lighter, fine grained species, such as cedar, burn too quickly to be main sources of fuel, but are suitable for kindling.

Fuelwood: Free Use Permits and Small Commercial Operations

In B.C., it is the policy of the Ministry of Forests to recognize the public demand for fuelwood as an alternative source of heating energy. The Ministry encourages public interest in the recovery of logging residues, non-commercial timber and salvage timber for fuelwood on Crown land.(2)

Through field offices of the various Forest Service District Managers, the Ministry considers applications from the public for harvesting fuelwood by individuals and small commercial operators. Successful applicants are directed to areas requiring rehabilitation measures following primary logging operations.

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(1) see Symposium Proceeding: Utilization of Western Canadian Hardwoods, Forintek Canada Corporation (May 1980) for discussion of mature inventory and commercial volumes.

(2) A copy of the B.C. Forest Service publication "Cutting Free Firewood" is provided in Appendix G.

People wishing to cut fuelwood for personal use have to apply for a Free Use Permit (FUP). The reason for the permit is to give the B.C. Forest Service a chance to discuss with the individual where and what to cut. Logging debris may be piled haphazardly at designated cutting sites and, clearly, cutting has to be controlled for reasons of personal safety and forest management. District Managers are responsible for identifying and designating areas suitable for cutting fuelwood.

In the case of logged areas within existing Crown tenures, forest licensees are encouraged to cooperate in making logging residues, windthrow, and other non-commercial timber available to FUP holders. Areas made available for the personal cutting of fuelwood are posted with signs indicating the relevant areas for cutting and permit holders can be supplied with a map showing the location.

The FUP system has become extremely popular with the public in recent years. Data on the number of FUP's issued and the volumes cut, by district, are not available in a form which would permit a meaningful evaluation in this study. Discussions with officials in the various forest districts in B.C. indicate, however, that there has been a substantial increase in the number of permit applications since the late 1970's.

For the Vancouver Forest District, it is reported that about 6,700 personal FUP's and approximately 75 commercial Timber Sales Licence agreements were issued for fuelwood during 1980. In addition to these, many of the Tree Farm Licence holders grant permission to private parties to cut fuelwood for personal use from logged-over lands within their licence agreement areas.

With regard to the southwestern B.C. area, one of the most significant constraints to SFBA usage and growth is the relatively limited supply of fuelwood near the more heavily populated centres. In the Lower Mainland and southern Vancouver Island, some difficulties have been reported in providing areas for free use fuelwood that are accessible to the general public by conventional passenger or truck vehicles. In the less populated areas of the region, fuelwood supplies appear to be plentiful.

In many areas of B.C., a significant amount of fuelwood is cut without prior application for a permit. There are no estimates available of the number of people doing so, but illegal cutting is reported to be a problem in some cases, and the number of complaints from land owners is growing. Forest District staff patrolling Crown land are also finding more people cutting in violation of the Forest Act. In other areas of the Vancouver forest region, including Vancouver Island (outside of the Capital Region), however, potential supplies of fuelwood are reported to be more than adequate for local needs, and there are many opportunities for individuals to obtain fuelwood around mill sites or outside the major areas of urban concentration.

In the Nelson forest region, there is no exact figure for the number of FUP's issued every year, but it is estimated that there are probably around 6,500 regular fuelwood users. The extent of commercial cutting varies from area to area, but it is reported that there are probably about 30 applications in the region each year, averaging about 150 cubic metres per sale for a total of around

4,500 cubic metres per year. Approximately 9,800 FUP's were issued in the Kamloops forest region in 1980, plus a small number of commercial hardwood fuelwood sales.

In the Cariboo forest region, there is widespread use of fuelwood. Applications for FUP's, however, are fairly low and it is reported that the bulk of fuelwood cut simply is not recorded. Supplies of fuelwood from logging slash, Mountain Pine Beetle killed trees, other non-commercial standing trees and blowdown are regarded to be plentiful and exceed present demand levels by many times. Estimates of fuelwood consumption, based on local knowledge of the approximate number of homes utilizing firewood and the average number of cords used by a household each year, suggest that probably around 22,000 cords are utilized per year. This includes an estimated 1,000 cords used for commercial sales to campgrounds.

FUP data relating to 1980 are not available for the Prince George forest region but, based on recent statistics, it is clear that there is extensive demand for fuelwood in the area, in particular close to urban communities. The forest resources of the area, and the high proportion of fast growing hardwood species compared with other regions, have facilitated a fairly high level of private cutting for fuelwood. The supply potential various among the various parts of the region, with some areas reporting high demand for birch but relatively limited supplies. Generally, both softwoods and hardwood fuelwood are obtained from the area. In the Prince Rupert forest region during 1980, permits were issued for a total personal-use fuelwood cut of around 10,000 cubic metres of timber.

It should be noted that the number of FUP's issued is only a partial measure of fuelwood usage in B.C. Extensive cutting is reported on private land and, as already mentioned, illegal cutting on private and on public land is not insignificant. Also, there are other significant sources such as wood gathered from beaches, land development areas and industrial wood wastes.

Future Supply of Fuelwood in B.C.

British Columbia has extensive forest resources. In terms of the overall demand for, and supply of, fuelwood for personal and commercial use, future availability appears to be assured. For the province as a whole, a considerable surplus of supply exists. Close to urban communities, however, the outlook is not quite as optimistic. Theoretical supply may be adequate in most cases, but effective supply is likely to be more restricted because of the problems of (a) public accessibility, (b) the increasing commercial value of former "weed" species such as alder and aspen, and (c) higher overall levels of private, commercial and industrial demand, as fossil fuel prices rise.

A detailed assessment of the future availability of residential fuelwood in B.C. was not part of the terms of reference of this study, however, some comments on the key issues are relevant to the forecast of future demand for SFBA's.

In rural and most smaller urban communities, there appear to be no long term constraints on fuelwood supply for individuals cutting for personal use. In some urban areas, particularly the metropolitan areas of the Capital Region and the Lower Mainland, shortages of accessible personal-use fuelwood are more apparent.

The Ministry of Forests FUP encourages cutting for personal needs. Many people take advantage of this facility and find that it makes sound economic sense. For others, however, the labour, equipment, time and travel costs needed to obtain this fuelwood make it unattractive and impractical. For some there is a significant element of recreation involved and the "value" derived therefore can offset any costs which may be incurred above the market purchase price of fuelwood.

As noted earlier, over the past few years there has been a substantial increase in the number of small operators cutting fuelwood for commercial purposes. Some of these obtain supplies from private woodlands and/or public forests, while others are based almost solely on fuelwood cutting on public land. A number of them operate on a more-or-less continuing basis providing a valuable community function. A few small commercial operators work on an opportunistic basis, when fuelwood is available from sub-division development or clearing of right-of-ways for linear developments such as highways.

In other instances, a few opportunistic operators reportedly have obtained supplies from logging companies but have defaulted on payment, thus souring the generally cooperative attitude of those logging companies willing to assist the 'bona fide' small commercial operators. Logging companies also report that, while many "weekenders" stick to the rules and cut fuelwood where designated by the Forest Service, others take advantage of the situation to cut commercial standing timber or merely help themselves to stacked timber already cut and designated for industrial use.

There appear to be a number of opportunities for expanding the scope for bona-fide commercial operators in B.C., particularly in areas serving the needs of large urban communities. It should also be recognized, however, that such operations may not be economically viable in every case if their supply is restricted to picking-over mixed or variable species and logging residues in scattered locations.

If fuelwood prices rise in line with generally forecast trends in energy prices, fuelwood may become a recognized forest "product" competing, in some areas, with commercial and industrial users for higher quality roundwood timber supplies.

In this context, it is relevant to note that the relative value of former "weed" species, notably alder and aspen, is likely to increase in some regions of the province. Where these species exist in commercial size stands, longer term options for roundwood utilization could include conversion to high value products such as mixed-species mechanical pulps, waferboard, and medium density fibreboard.

Use of Wood Residues

Rapidly rising costs of conventional fuels in the U.S. and Canada resulted in renewed interest in the industrial use of wood residues and densified wood fuel, such as Woodex pellets for fuel during the 1970's. However, contrary to the trend in industry, the use of wood residues, such as sawdust and prepared fuels, for residential heating have not experienced a resurgence. The obvious reasons appear to be supply and distribution limitations, the need for replacing existing heating equipment, problems with storage and handling of the fuel and air pollution problems. The manufacture of densified wood fuel-logs for residential use declined in volume toward 1981 because of competing industrial uses for the furnish. However, a new entrant into fuel log manufacture, Holland Developments Ltd., was building a plant in Langley for start-up in 1982.

Coal

It was noted earlier that B.C. has significant reserves of coal. Currently, most of the province's production is exported and comparatively little development has occurred so far in industrial use of coal as a primary fuel. This is attributed to the availability of natural gas at favourable prices.

As a fuel for home heating purposes, coal is used fairly extensively in the eastern U.S. and in Europe. Its use in most parts of Canada is comparatively limited. A comparative analysis of the advantages and disadvantages of coal and other energy forms for home heating purposes is beyond the scope of this analysis. Nevertheless, it should be recognized that some potential does exist in B.C. in this regard. It should also be noted that few SFBA's made in the province are suitable, or safe, for coal.

Naturally occurring smokeless fuels (e.g., anthracite), manufactured smokeless fuels and bituminous coal have been used in Europe for some time. Many SFBA's made in Europe are designed for combination fuels, including wood and densified wood fuels. Experience in Europe and the eastern U.S. shows that the typical pattern of development in coal-rich areas has been (a) expansion of industrial applications, (b) increased commercial use, and then (c) growth in residential coal forms and use. There have been a few exceptions to this, particularly where suitable coal for home-use occurs naturally, and it appears, therefore, that extensive use at the residential level need not entirely depend on the prior development of significant industrial and commercial applications.

Costs of coal, natural gas and heat that are equivalent to various oil prices are tabulated below:

Fuel Type	Oil Price		
	$20/bbl.	$30/bbl	$40/bbl
Coal ($ per tce)	$ 95.	$ 142	$ 190
Natural gas ($ per 1000 cf)	$ 3.30	$ 5.00	$ 6.60
Heat ($ per million Btu)	$ 3.40	$ 5.10	$ 6.80

* ton of coal equivalent, i.e. a metric ton (2,205 lb) of coal with a specific heating value of 12,600 Btu/lb.

Source: Consultants' Estimates

APPENDIX G

Slas[illegible]
Mai[illegible]
piec[illegible]

[illegible]

Safety Tips

- Wear [illegible] saw [illegible] a good pair of steel-toed boots [illegible]
- In[illegible] wo[illegible]
- [illegible]

Hel[illegible]

BRITISH COLUMBIA FOREST SERVICE

Cutting Free Firewood

APPENDIX G

Soon you may wish to try your hand at cutting firewood for your fireplace, home or cottage.

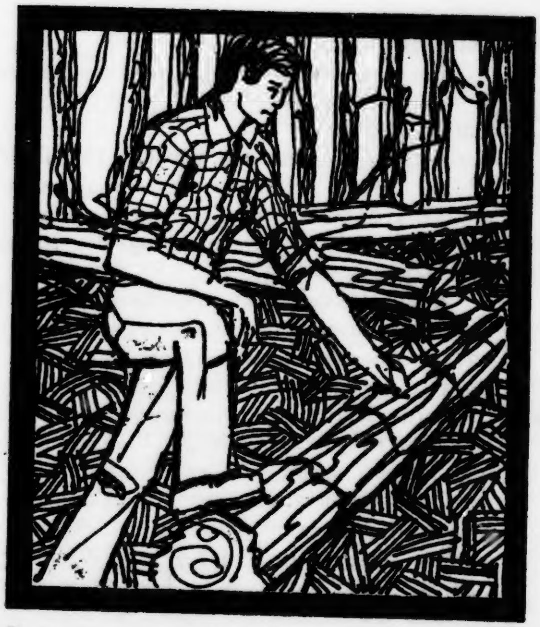
Under the Forest Service public recreation program, here's how you can get your share.

First, you'll have to apply for a "Free Use Permit", available from your local Forest Ranger's office. You will be allowed to cut 'downed' timber only, which must be taken from areas designated by the Ranger. The reason you must obtain a permit is to give the British Columbia Forest Service a chance to talk with you about where and what to cut. All firewood must be for your personal use — it is not to be sold for commercial gain.

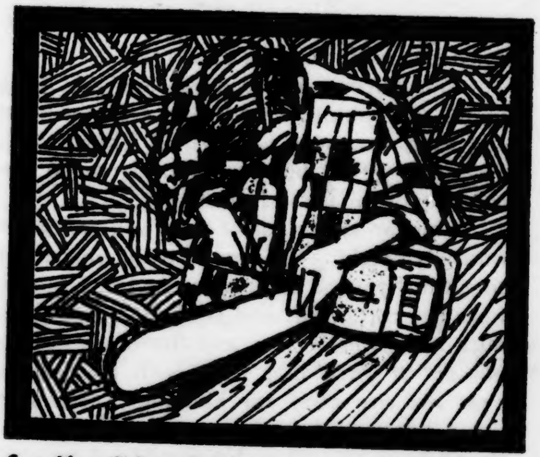
Before putting your permit to use be sure your saw is in good condition. You may be cutting logs with embedded soil or gravel and will be working close to the ground. If you are using a chain saw, take a saw file and use it. Don't forget gas, chain oil, sledgehammer, splitting wedges, an axe, and a good pair of steel toed work boots. Footing problems are aggravated by damp weather, difficult terrain and awkward working positions. You'll probably work up a healthy appetite, so take along sandwiches and a thermos.

People cutting firewood for the first time often make two big mistakes:

1. Going out with too small a saw, one with less than 16-inch bar. This results in a lot of wasted time by just chewing at big logs.
2. Renting a huge truck in the belief you can cut five cords of wood single handedly in an afternoon. Or, on the other extreme, using a station wagon thinking it will take all afternoon to fill it. As a rule, it will take about three hours for two people to cut, split, and a load a typical pickup truck. (about 3/4 of a cord.) A full cord of wood when split is eight feet long, four feet wide and four feet high.



Keep your saw out of the dirt by making a series of partial cuts through a log. Then roll it over and finish the cuts from the other side of the log.



Saw file will keep the chain sharp in spite of mud and gravel caked on the logs in slash piles. A dull chain saw slows work, and puts extra strain on saw engine.

Working Slash Piles

Logging debris may be piled haphazardly at designated cutting sites, so you'll have to look the situation over carefully before you begin cutting. If possible, throw a line around a likely log and pull it out where you can work on flat ground. Otherwise, work around the pile as though you were giving it a haircut, trimming protruding ends.

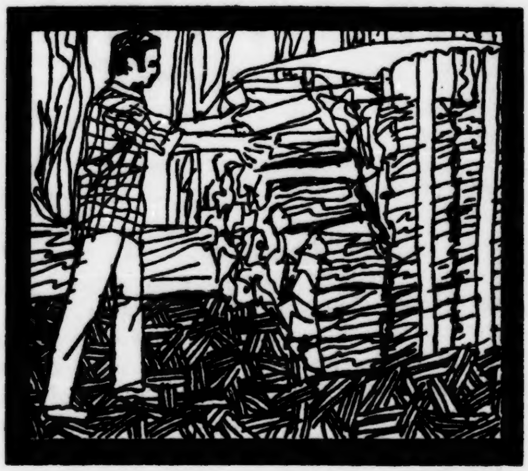
Logs in slash piles may be stacked with their limbs intertwined like springs, waiting for your saw to release them. Other logs will be on slopes where they can roll. You could be cutting large, heavy logs that can do considerable damage if they're cut without a thought to what will happen when they're released. Even a small log is wet and heavy — and dangerous, and must be treated with respect. Always be careful. Always "read" a log before you start cutting. Some logs will be kept from rolling by their own limbs and roots, so don't accidentally or carelessly cut them off.

The Best Woods for Burning

When available, Douglas fir is a good all-around fuel. If cut in the spring, wood is usually dried and ready to burn by winter.

Pine burns well, as does alder and birch. Light, fine-grained woods like cedar will pop and snap, throwing hot sparks. They're good for kindling, but burn too quickly to be considered your main source of fuel.

You can save a lot of time and energy by carefully checking the type of wood you're cutting. Mushy wood may dry out just fine, but the fiber has rotted out and the wood won't produce much heat. Pines and firs often contain pockets of pitch that burn with tremendous heat and are good for kindling. Large softwood knots and burls are so tight-grained they'll burn as well as hardwoods. Any wood you cut should be sound, without rot or insect damage. Such clean wood is evident by its crisp, sharp splinters.



Cover stacked wood to speed seasoning. For fastest drying, stack the wood off the ground and lay strips of lath between the courses of logs to allow air circulation.

If you have space to work, and the time, split your wood at the site. It will stack better in your vehicle. Use steel wedges and a sledgehammer. Split toward the center, working from the edge in. Take advantage of cracks in wood which has started to season. Split in halves, and split from the small end of the log toward the large end. Check the sides of the piece to make sure you're not running the split down on a large knot.

When you get home, stack your wood off the ground and out of direct weather. Split before stacking, and be sure your wood-pile is solid, so children can't accidentally knock it over. Plan to let your wood "cure" at least five or six months if possible.

A cord of wood may take you all day to cut, deliver, and stack at home, and may require five or six trips to haul in a station wagon. If you're any distance from the cutting site, consider renting a truck with a neighbour and cutting together.

For further information, contact the Forest Ranger Station in your area, as listed in the white pages of your telephone directory under "Forest Service Ranger".

APPENDIX H

A dwelling is a separate set of living quarters with a private entrance from the outside or from a common hallway or stairway inside the building. This entrance should not be through someone else's living quarters.

7. Enter the name of the person (or one of the persons) who lives here and is responsible for paying the rent, or mortgage, or taxes, or electricity, etc., for this dwelling.

07

01 ☐ ______________________________

Last name — Given name and initial

This person should answer the following questions about this dwelling.

NOTE: If no one living here makes any such payments, mark here ☐ and answer the dwelling questions yourself.

8. How many persons usually live here (according to the WHOM TO INCLUDE item in the INSTRUCTIONS FOR QUESTION 1)?

02 ☐ Number of persons

9. Did you leave anyone out of Question 1 because you were not sure whether he or she should be listed? *For example, a student, a lodger who also has another home, a new baby still in hospital, or a former occupant of this household who has become a patient in a hospital or sanatorium within the past six months.*

☐ Yes ☐ No

If "Yes", print the name of each person left out and the reason.

Name ______________________________

Reason ______________________________

____

Name ______________________________

Reason ______________________________

____

If you require more space, please use the Comments section on the back cover.

10. How many persons who have a usual home elsewhere in Canada are staying or visiting here temporarily (as of Census Day, June 3)?

☐ None

OR

☐ Number of persons

11. Is this dwelling:

Mark one box only

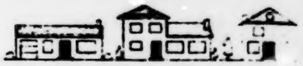
03 ☐ owned or being bought by you or a member of this household?

04 ☐ rented (even if no cash rent is paid)?

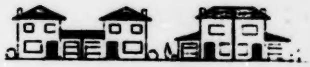
12. Is this dwelling a:

Mark one box only

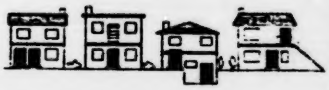
05 ☐ **single house** — a single dwelling not attached to any other building and surrounded on all sides by open space?



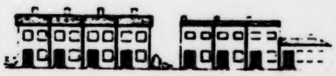
06 ☐ **semi-detached or double house** — one of two dwellings attached side by side but not attached to any other building and surrounded on all other sides by open space?



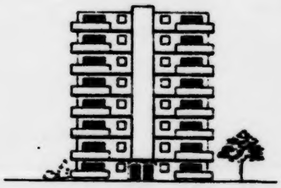
07 ☐ **duplex** — one of two dwellings, one above the other, not attached to any other building and surrounded on all sides by open space?



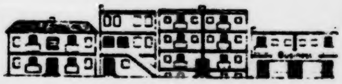
08 ☐ **row house** — one of three or more dwellings joined side by side but not having any other dwellings either above or below?



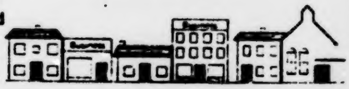
09 ☐ **apartment in a building that has five or more storeys** — for example, a dwelling unit in a highrise apartment building?



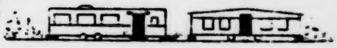
10 ☐ **apartment in a building that has less than five storeys** — for example, a dwelling unit in a triplex, quadruplex or a dwelling unit in a non-residential building or in a house that has been converted?



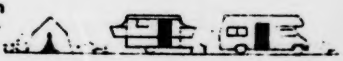
11 ☐ **house attached to a non-residential building** — a single dwelling attached at ground level to another building (such as a store, etc.) but separated from it by a common wall running from ground to roof?



12 ☐ **mobile home** (designed and constructed to be transported on its own chassis and capable of being moved on short notice)?



13 ☐ **other movable dwelling** (such as a tent, travel trailer, railroad car or houseboat)?



OFFICE USE ONLY

14 ☐ Trans.

15 ☐ Coll.

16 ☐ Ref.

17 ☐ Miss.

18 ☐ JIC – A

19 ☐ JIC – B

APPENDIX H

13. When was this dwelling or the building containing this dwelling originally built? (To the best of your knowledge, mark the period in which the building was completed, not the time of any later remodelling, additions or conversions.)

08

Mark one box only

01 ☐ 1920 or before
02 ☐ 1921 - 1945
03 ☐ 1946 - 1960
04 ☐ 1961 - 1970
05 ☐ 1971 - 1975
06 ☐ 1976 - 1979
07 ☐ 1980
08 ☐ 1981

14. How long have you lived in this dwelling?

Mark one box only

09 ☐ Less than one year
10 ☐ One to two years
11 ☐ Three to five years
12 ☐ Six to ten years
13 ☐ More than ten years

15. How many rooms are there in this dwelling? (Include kitchen, bedrooms, finished rooms in attic or basement, etc. Do not count bathrooms, halls, vestibules and rooms used solely for business purposes.)

14 ____ Number of rooms

16. How many bathrooms are there within this dwelling?

(See Guide for further information.)

15 ☐ None

OR

16 ____ Number of complete bathrooms

17 ____ Number of half bathrooms

17. What is the main type of heating equipment for this dwelling?

Mark one box only

18 ☐ Steam or hot water furnace
19 ☐ Forced hot air furnace
20 ☐ Installed electric heating system
21 ☐ Heating stove, cooking stove, space heater
22 ☐ Other (fireplace, etc.)

18. (a) Which fuel is used most for heating this dwelling?

23 ☐ Oil or kerosene
24 ☐ Piped gas, e.g., natural gas
25 ☐ Bottled gas, e.g., propane
26 ☐ Electricity
27 ☐ Wood
28 ☐ Coal or coke
29 ☐ Other fuel

(b) Which fuel is used most for water heating in this dwelling?

30 ☐ Oil or kerosene
31 ☐ Piped gas, e.g., natural gas
32 ☐ Bottled gas, e.g., propane
33 ☐ Electricity
34 ☐ Wood
35 ☐ Coal or coke
36 ☐ Other fuel

19. Is this dwelling in need of any repairs? (Do not include desirable remodelling or additions.)

37 ☐ No, only regular maintenance is needed (painting, furnace cleaning, etc.)
38 ☐ Yes, minor repairs are needed (missing or loose floor tiles, bricks or shingles, defective steps, railing or siding, etc.)
39 ☐ Yes, major repairs are needed (defective plumbing or electrical wiring, structural repairs to walls, floors or ceilings, etc.)

Answer Questions 20 to 22 for only the dwelling that you now occupy even if you own or rent more than one dwelling. If exact amount is no known, please enter your best estimate.

NOTE: If you are a farm operator living on the farm you operate, mark here

40 ☐ and go to page 6.

20. For this dwelling, what are the yearly payments (last 12 months) for

(a) electricity?

41 ☐ None, or included in rent or other payments,

OR

Dollars Cents

42 ______ 00 per year

(b) oil, gas, coal, wood or other fuels?

43 ☐ None, or included in rent or other payments,

OR

Dollars Cents

44 ______ 00 per year

(c) water and other municipal services?

45 ☐ None, or included in rent, municipal taxes or other payments,

OR

Dollars Cents

46 ______ 00 per year

21. For RENTERS only: What is the monthly cash rent you pay for this dwelling?

47 ☐ Rented without payment of cash rent

OR

Dollars Cents

48 ______ 00 per month

Go to page 6

22. For OWNERS only:

(a) What are your total regular monthly mortgage (or debt) payments for this dwelling?

49 ☐ None ▶ *Go to Question 22(c)*

OR

Dollars Cents

50 ______ 00 per month

(b) Are your property taxes (municipal and school) included in the amount shown in Question 22(a)?

51 ☐ Yes ▶ *Go to Question 22(d)*
52 ☐ No

(c) What are your estimated yearly property taxes (municipal and school) for this dwelling?

53 ☐ None

OR

Dollars Cents

54 ______ 00 per year

(d) If you were to sell this dwelling now, for how much would you expect to sell it?

Dollars Cents

55 ______ 00

(e) Is this dwelling part of a registered condominium?

56 ☐ Yes
57 ☐ No